AEFA Project No. 86-22

AD-A206 181

AEFA

LOSS OF TAIL ROTOR EFFECTIVENESS EVALUATION OF THE OH-58C HELICOPTER WITH DIRECTIONAL SAS

Frederick W. Stellar
MAJ, AV
Project Officer/Pilot

James D. Brown
MAJ, AV
Project Pilot

Michael K. Herbst
Project Engineer

Christopher P. Butler
Project Engineer

Timothy Hathorn
Project Engineer

August 1988

Final Report

Approved for public release, distribution unlimited.

AVIATION ENGINEERING FLIGHT ACTIVITY
Edwards Air Force Base, California 93523-5000

DISCLAIMER NOTICE

The findings of this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

DISPOSITION INSTRUCTIONS

Destroy this report when it is no longer needed. Do not return it to the originator.

TRADE NAMES

The use of trade names in this report does not constitute an official endorsement or approval of the use of the commercial hardware and software.

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY U.S. ARMY AVIATION SYSTEMS COMMAND	3. DISTRIBUTION/AVAILABILITY OF REPORT
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) AEFA PROJECT NO. 86-22	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION U.S. ARMY AVIATION ENGINEERING FLIGHT ACTIVITY 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State, and ZIP Code) EDWARDS AIR FORCE BASE, CALIFORNIA 93523-5000	7b. ADDRESS (City, State, and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION U.S. ARMY AVIATION SYSTEMS COMMAND 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State, and ZIP Code) 4300 GOODFELLOW BLVD. ST. LOUIS, MO 63120-1798	10. SOURCE OF FUNDING NUMBERS PROGRAM ELEMENT NO.: EJ7Y5440-02 PROJECT NO.: -EJ TASK NO.: WORK UNIT ACCESSION NO.:

11. TITLE (Include Security Classification)
LOSS OF TAIL ROTOR EFFECTIVENESS EVALUATION OF THE OH-58C HELICOPTER WITH DIRECTIONAL SAS, UNCLASSIFIED

12. PERSONAL AUTHOR(S)
MAJ Frederick W. Stellar, MAJ James D. Brown, Michael K. Herbst, Christopher P. Butler, Timothy Hathorn

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
FINAL	FROM 23/06/87 TO 25/09/87	AUGUST 1988	302

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	Directional Stability Augmentation System (SAS), Loss of Tail Rotor Effectiveness (LTE) Evaluation

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The U.S. Army Aviation Engineering Flight Activity conducted a loss of tail rotor effectiveness (LTE) evaluation of the JOH-58C ~~from 23 June through 25 September 1987.~~ The JOH-58C configuration includes a directional stability augmentation system (SAS) manufactured by the SFENA Corporation, the larger-diameter tail rotor, and the improved engine fuel control. Handling qualities were evaluated at Edwards AFB, California (elevation 2302 feet). Twenty-eight flights were conducted for a total of 26.7 productive flight test hours. Primary emphasis of the evaluation was to evaluate the handling qualities of the JOH-58C in comparison to the standard OH-58C. The limited authority SAS (7% of full control travel) will not significantly reduce the conditions conducive to LTE. The overall handling qualities of the JOH-58C were moderately improved compared to the standard OH-58C. The concept of a SAS which damps uncommanded yaw rates demonstrated potential for reducing conditions conducive to LTE. However, the limited authority SAS saturated at small yaw rates (6 deg/sec) and did not significantly reduce the characteristic high yaw rates and moderate yaw attitude excursions observed in the JOH-58C. The JOH-58C exhibited moderate pitch, roll, and yaw excursions at 15 to 25 KTAS in azimuths from 240 degrees clockwise to 280 degrees. This characteristic was a shortcoming, upgraded from a deficiency for the standard OH-58C. Five additional shortcomings, of which four were previously identified in the standard OH-58C, were noted.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL SHEILA R. LEWIS	22b. TELEPHONE (Include Area Code) (805) 277-2115 22c. OFFICE SYMBOL SAVTE-PR

DD Form 1473, JUN 86 Previous editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

TABLE OF CONTENTS

Page

APPENDIXES

DISTRIBUTION

INTRODUCTION

BACKGROUND

1. Loss of tail rotor effectiveness (LTE) has been a problem with the OH-58 series aircraft and has been identified as a contributing factor in many accidents. In an effort to understand LTE, the U.S. Army evaluated the Bell Helicopter Textron Incorporated (BHTI) model 206 helicopter with a ring-fin configuration (ref 1, app A), the OH-58C helicopter with a 3-axis Stability Control Augmentation System (SCAS) (ref 2), and the JOH-58C with the SFENA 3-axis SCAS and larger tail rotor (ref 3). Army efforts were directed toward a comparative evaluation of the OH-58C with a ring-fin configured tail rotor and with a single-axis directional stability augmentation system (SAS). The OH-58C ring-fin program was terminated prior to completion and the comparative evaluation was canceled. The U.S. Army Aviation Engineering Flight Activity (AEFA) was tasked by the U.S. Army Aviation Systems Command (AVSCOM) to conduct a test program to evaluate the OH-58C helicopter with single-axis directional SAS (ref 4). A test plan (ref 5) was submitted and approved.

TEST OBJECTIVES

2. The objectives of this test were to evaluate the capability of a directional SAS to minimize the occurrence of conditions conducive to encountering LTE and determine the handling qualities of the OH-58C with a directional SAS, increased diameter tail rotor, and engine droop kit installed.

DESCRIPTION

3. The JOH-58C test helicopter, U.S. Army S/N 70-15349, was a modified OH-58C configured with a limited authority (7% of full control travel) directional SAS, manufactured by SFENA Corporation. The OH-58C, manufactured by BHTI, has a single, two-bladed, semirigid, teetering main rotor and a single, two-bladed, delta-hinged, semirigid, teetering tail rotor. Maximum gross weight is 3200 pounds. The aircraft is powered by an Allison T63-A-720 engine with an uninstalled intermediate power rating (30 minutes) of 420 shaft horsepower (shp) at standard sea level conditions, derated to 317 shp (main transmission limit). A detailed description of the standard OH-58C is contained in the operator's manual (ref 6, app A). The test helicopter incorporated the larger tail rotor (65 in. diameter) and the OH-58C engine droop kit product improvement. The helicopter was modified with a SFENA limited authority directional SAS and a hydraulically boosted tail rotor. The SFENA directional SAS is described in appendix B.

TEST SCOPE

4. The LTE evaluation was conducted at Edwards AFB, California (elevation 2302 ft). Twenty-eight flights were conducted for a total of 26.7 productive flight test hours between 23 June and 25 September 1987. Testing was accomplished within the constraints of the airworthiness release (ref 7, app A) and the operator's manual (ref 6).

Handling qualities were evaluated using MIL-H-8501A (ref 8) as a guide. Test conditions are presented in table 1.

TEST METHODOLOGY

5. Flight test data were recorded on magnetic tape using an onboard instrumentation package. A description of test instrumentation is presented in appendix C. Established flight test techniques (ref 9, app A) were used to determine the basic handling qualities of the JOH-58C with directional SAS ON and OFF. Test techniques and data analysis methods are briefly discussed in appendix D. Additional tests were designed to evaluate the capability of the directional SAS to minimize the occurrence of conditions conducive to LTE. The conditions which are conducive to LTE are discussed in the OH-58C operator's manual (ref 6). These include: (a) weathercocking, combined with the inherent yaw characteristic of the aircraft, which results in increasing yaw rates; (b) tail rotor vortex ring state which results in pitch, roll, and yaw excursions; and (c) main rotor disc vortex interference with the tail rotor which results in sudden right yaw rate. These conditions are significantly influenced by aircraft gross weight and density altitude (power margin), low speed flight, and transient rotor speed droop. A Handling Qualities Rating Scale (HQRS) (fig. D-1) and a Vibration Rating Scale (VRS) (fig. D-2) were used to augment pilot comments.

Table 1. Test Conditions[1]

Test	Average Gross Weight (lb)	Average Density Altitude (ft)	Trim Airspeed (kt)	Remarks
Static Lateral-Directional Stability	2890	6110	96, 63 KCAS[2]	Level Flight
			64 KCAS	MRP[3] Climb
			62 KCAS	Autorotation
Maneuvering Stability	2960	6650	64 KCAS	Left and Right Turns
Dynamic Stability	2930	5900	100, 64 KCAS	Level Flight
	2970	3850	0, 10, 20, and 30 KTAS[4]	Left and right directional pulses at 90, 120, 150, 180, 210, 240 and 270 relative wind azimuth
Controllability	2910	3120	0, 10, 15 and 20 KTAS	Directional step inputs at 90 and 270 relative azimuth
Low Speed Flight	2990	3750	7 to 32 KTAS	Steady heading at relative wind azimuths of 045, 090, 120, 150, 180, 210, 225, 240, 270, 280, 290, 300, 310, 320, 330, 340, 350, and 360. Azimuths 120, 180, and 240 repeated with pilot and copilot doors removed.
	2700	3990	6 to 30 KTAS	Left/right yaw rates of 10 and 20 deg/sec established at 120/240 deg azimuth. Directional control fixed in the weathercock region (120 to 240 deg azimuth)
Trim Changes with Power	3080	7910	31, 40 and 51 KCAS	SAS OFF only Sideslip increments of 10 deg to ±30 deg. Power changes from 93% to 10% engine torque.
Mission Maneuvers	2850	3020	0 to 100 KCAS	Hover, hover turns, quickstops, takeoffs to hover, landings from hover, slope landings and nap-of-the earth flight. Performed in moderate to high winds.

NOTES:

[1]Tests conducted at mid longitudinal and lateral center of gravity, with SAS both ON and OFF, pilot and copilot doors installed, 100% main rotor speed (354 revolutions per minute) unless otherwise noted.
[2]KCAS: Knots calibrated airspeed.
[3]MRP: Maximum rated power.
[4]KTAS: Knots true airspeed.

RESULTS AND DISCUSSION

GENERAL

6. A loss of tail rotor effectiveness evaluation of the JOH-58C was conducted at Edwards AFB (elevation 2302 feet) at the test conditions listed in table 1. Primary emphasis of the test was to evaluate the handling qualities of the JOH-58C in comparison to the standard OH-58C. The limited authority (7% of full control travel) SAS will not significantly reduce the conditions conducive to encountering LTE. The overall handling qualities of the JOH-58C were moderately improved as compared to the standard OH-58C. Prior testing of the JOH-58C with a 3-axis SCAS installed revealed flying qualities of the JOH-58C were significantly improved in comparison to the standard OH-58C (ref 3, app A). The concept of a SAS which damps uncommanded yaw rates demonstrated potential for reducing the conditions conducive to LTE. However, the limited authority directional SAS saturated at small yaw rates (6 deg/sec) and did not significantly reduce the characteristic high yaw rates and moderate yaw attitude excursions observed in the JOH-58C. As a result, the test was terminated prior to completion of all scheduled tests. The JOH-58C helicopter exhibited moderate pitch, roll, and yaw excursions at 15 to 25 KTAS in azimuths from 240 degrees clockwise to 280 degrees. This characteristic was a shortcoming, upgraded from a deficiency for the standard OH-58 (ref 10). Five additional shortcomings, four of which were previously identified, were noted.

HANDLING QUALITIES

Control System Characteristics

7. The mechanical characteristics of the JOH-58C hydraulically boosted flight control system were measured on the ground with the rotors and engine stopped and were qualitatively verified in flight. Hydraulic and electrical power were provided by external sources. All adjustable control friction devices were set to minimum friction. The SAS was ON but had no effect on control system characteristics. Force trim was ON and collective was full down.

8. The limits of longitudinal and lateral cyclic control travel are presented in figure E-1. The variation of control position with applied control force for the longitudinal and lateral controls is presented in figures E-2 and E-3. The longitudinal and lateral cyclic control force gradients were positive and essentially linear with no discontinuities. Breakout forces, including friction, were similar to those of the standard OH-58C helicopter. Longitudinal centering characteristics were positive but not absolute, resulting in a 0.8-inch longitudinal trim control displacement band. Lateral centering characteristics were positive but not absolute, resulting in a trim control displacement band of 1.3 inches. The large trim control displacement bands increased pilot workload when attempting to maintain desired attitudes during maneuvering flight (para 11). The large longitudinal and lateral trim control displacement bands of the JOH-58C remain a shortcoming as previously reported for the standard OH-58C helicopter (ref 10, app A).

9. The directional control breakout force (including friction) was 4.0 pounds right and 4.5 pounds left. The directional control breakout force (including friction) of the

standard OH-58C was 6.8 pounds right and 5.5 pounds left. The directional control system did not incorporate a force trim mechanism; therefore, no control centering existed. Although there was no directional control centering, the directional control system characteristics are satisfactory. The directional control system characteristics failed to meet the requirements of paragraph 3.3.10 of MIL-H-8501A, in that, there were no positive self-centering characteristics.

Static Lateral-Directional Stability

10. The static lateral-directional stability characteristics of the JOH-58C were evaluated at the conditions listed in table 1. Test results are presented in figures E-4 through E-9. Static directional stability was positive (left directional control required to maintain right sideslip). Effective dihedral was positive for right sideslips (right lateral control required) but approached neutral for left sideslips at most conditions. Side force characteristics were positive (increasing right roll attitude and increasing right sideslip). The directional SAS had no apparent effect on the static lateral-directional stability characteristics. The static lateral-directional stability characteristics of the JOH-58C were similar to the standard OH-58C (ref 10, app A). The pilot had adequate cues of an out-of-trim condition and was able to correct this condition easily. The static lateral-directional stability characteristics of the JOH-58C are satisfactory.

Maneuvering Stability

11. The maneuvering stability characteristics of the JOH-58C were evaluated in left and right steady turns at the conditions listed in table 1. Maneuvering stability data are presented in figure E-10. Maneuvering stability was positive (aft longitudinal control required to maintain increased center of gravity (cg) normal acceleration) at normal accelerations up to 1.4 g and was similar to the standard OH-58C. Maintaining airspeed control within 2 knots at a bank angle of 45 degrees (1.4g) required ±1 inch of longitudinal control displacement. Maintaining bank angle at 45 degrees was difficult because of the aircraft's pitch up divergence ("dig in" tendency), the large longitudinal and lateral trim control displacement bands, and the moderate airframe vibrations (VRS 4). The standard OH-58C had a similar "dig in" tendency and high pilot workload at bank angles of 45 degrees. At all bank angles the pilot workload in the JOH-58C was essentially the same as in the standard OH-58C. No qualitative or quantitative differences were noted SAS ON or OFF. The pitch up divergence at 1.4g or 64 knots calibrated airspeed (KCAS) in the JOH-58C remains a shortcoming as previously reported for the standard OH-58C (ref 10, app A).

Dynamic Stability

Short-Term (Gust Response):

12. The lateral-directional short-term dynamic stability characteristics of the JOH-58C were evaluated at the test conditions listed in table 1. Gusts were simulated by 0.5 second duration directional control pulse inputs of up to 1 inch, directional control doublets, and releases from steady-heading sideslips. The aircraft lateral-directional gust response characteristics were also evaluated in light turbulence. Data for pulses are presented in figures E-11 to E-127. Data for doublets are presented in figures E-128 to E-131. Data for releases from steady heading sideslips are presented in figures E-132 to E-139.

13. The short-term rate damping provided by the SAS improved the aircraft's gust response in light turbulence. The lateral-directional gust response observed in forward flight with SAS ON was highly damped. The highly damped lateral-directional response was an improvement over the easily excited lateral-directional oscillations of the standard OH-58C (ref 10, app A). The lateral-directional short-term dynamic stability characteristics of the JOH-58C in forward flight with SAS ON are satisfactory.

14. The lateral-directional gust response observed in forward flight with SAS OFF was oscillatory and easily excited. The SAS OFF lateral-directional short-term dynamic stability characteristics of the JOH-58C in forward flight are similar to those previously reported as a shortcoming for the standard OH-58C (ref 10).

15. One-inch directional pulse inputs at selected azimuths in low-speed flight were tested with SAS ON with pilot and copilot doors installed and removed. The JOH-58 helicopter response to a simulated gust (pulse input) was characterized by a rapid yaw acceleration. Consequently, moderate yaw rates developed. With SAS ON, these rates resulted in momentary saturation of the SAS actuator and the peak yaw rates were approximately 20 degrees/second. Generally, the aircraft returned to the trim condition following a directional pulse input. However, at the 210 degree relative azimuth at 30 KTAS a right pulse input was characterized by an increasing right yaw and divergence from the trim azimuth (fig. E-95). No qualitative or quantitative differences were observed with the pilot and copilot doors removed. The SAS ON directional gust response in low-speed flight was moderately damped.

16. The aircraft was hovered in gusty wind conditions with SAS ON. Rate damping provided by the SAS improved the JOH-58C gust response. Though increased damping provided by directional SAS reduced the yaw attitude excursions in a hover, yaw attitude excursions were greater than 3 degrees and frequent (every second), moderate (±1/4 to 1/2 inch) pedal inputs were required to maintain heading at these conditions (HQRS 5).

17. One-inch directional pulse inputs at selected azimuths in low-speed flight were conducted SAS OFF. Maximum yaw rates with SAS OFF were occasionally twice as high as those with SAS ON. SAS OFF aircraft response to the simulated gust was less predictable than with SAS ON, resulting in variable yaw rates. The aircraft seldom returned to the trim azimuth following a pulse input. Figure E-74 shows the variable yaw rate following a right directional pulse at 20 KTAS which resulted in divergence from the trim azimuth. No qualitative or quantitative differences were observed with the pilot and copilot doors removed. The SAS OFF short-term dynamic stability characteristics observed in low-speed flight in the yaw axis were lightly damped.

18. The aircraft was hovered in gusty wind conditions SAS OFF. Aircraft response while hovering in gusty winds resulted in increasing yaw rates. Frequent (every second), moderate (±1/2 inch) pedal inputs were required to maintain heading within ±3 degrees in a hover (HQRS 6).

Long Term:

19. Spiral stability characteristics of the JOH-58C were evaluated by observing aircraft response to control releases from left and right coordinated turns. Data are presented in

figures E-140 to E-147. The JOH-58C exhibited convergent spiral stability in both left and right turns SAS ON and OFF up to 5 degrees of bank. SAS ON, the spiral stability was convergent up to 10 degrees angle of bank. The spiral stability characteristics of the JOH-58C SAS ON and OFF are satisfactory.

20. Longitudinal long term response was evaluated by trimming the aircraft at the desired airspeed and then decreasing airspeed by 10 knots, using only cyclic control. The cyclic was then returned to the trim position and the helicopter response was observed. Time history data are presented in figures E-148 through E-151. The standard OH-58C longitudinal response was convergent and moderately damped and the JOH-58C showed a similar response. At 67 KCAS, SAS ON the aircraft was convergent in all axes. At 101 KCAS, SAS ON or OFF the predominant characteristic was a slowly diverging roll which was easily controlled. The longitudinal long term response of the JOH-58C is satisfactory.

Controllability

21. The directional control response (angular rate one second after a one-inch control displacement) and control sensitivity (maximum angular acceleration per one-inch control displacement) of the JOH-58C were evaluated at the conditions listed in table 1. Step inputs during low speed flight were limited to 1/4 inch due to the occurrence of main transmission overtorque during recovery from right yaw rates during a hover.

22. Data for directional controllability characteristics are presented in figures E-152 through E-157. The aircraft responded in the proper direction within 0.2 seconds after the input and no objectionable coupling was noted. The JOH-58C with SAS ON had increased yaw rate damping as compared to the standard OH-58C (ref 10, app A). However, SAS was quickly saturated and the high control sensitivity was similar to SAS OFF sensitivity. Yaw rate continually increased until recovery was initiated. Directional response was satisfactory during recovery but a tendency to overcontrol was noted at the 270 degree azimuth. At the moderate gross weights tested, increasing yaw rates and insufficient power margin required increased pilot attention to torque limits. Moderate ($\pm 1/2$ inch) but smooth directional control movements were required to arrest right yaw rates. No repeatable data were obtained during controllability tests above 15 KTAS at the 270 degree azimuth due to frequent SAS saturation and the $\pm 1/4$ to 1/2 inch directional control inputs required to maintain trim conditions. The directional controllability characteristics of the JOH-58C with SAS OFF were characterized by more rapid accelerations in the yaw axis, and were similar to the standard OH-58C which were reported as a shortcoming. The high control sensitivity SAS ON and OFF resulting in directional overcontrol remains a shortcoming in the JOH-58C.

Low-Speed Flight Characteristics

General:

23. Low-speed flight characteristics were evaluated to determine the effects on handling qualities due to the installation of the directional SAS, larger tail rotor, and engine droop kit. Low-speed flight testing was conducted to simulate hovering in winds by stabilizing in formation with a calibrated ground pace vehicle at a skid height of approximately 10 feet

at relative azimuths (measured clockwise from the nose of the aircraft) from 0 degrees to 350 degrees. The low-speed flight characteristics for this aircraft will be discussed by reference to one of three regions (fig. A): 290 degrees clockwise to 120 degrees (region A), 120 degrees clockwise to 240 degrees (region B) and 240 degrees clockwise to 290 degrees (region C). Additional low speed tests were conducted by initiating a left or right yaw rate and maintaining fixed directional and collective controls while in the weathercock stability region (120 to 240 deg). Upon reaching the region boundary, recovery was initiated.

24. HQRS were assigned in accordance with the scale in figure D-1 to describe the pilot workload to conduct a simulated mission task of hovering in winds. The standards for desired mission performance required maintaining the aircraft within ±3 degrees of desired heading and ±2 feet of desired skid height. Although the HQRS may be different for actual hover in winds (as opposed to the simulated task) the ratings are useful for quantifying the effects on pilot workload of the SAS and of varying wind speed and direction. Tests were conducted SAS ON and OFF at the test conditions listed in table 1. Low-speed flight characteristics data are presented in figures E-158 through E-208. No qualitative or quantitative differences were observed with the pilot and copilot doors removed. Figure B shows a HQRS summary for azimuths tested in low-speed flight.

Region A:

25. At 3410 feet, the JOH-58C had 30% margin remaining at 30 KTAS with SAS ON or OFF (fig. E-162 and E-163). Wind tunnel tests have shown main rotor vortex interference with the tail rotor to occur between 10 and 20 knots from the 280 to 320 azimuth (ref 10, app A). Although directional control excursions were small (±1/4 inch) from 290 to 300, large longitudinal cyclic trim changes were required. At the 300 degree azimuth there was a large (1 inch) aft longitudinal cyclic trim change required as airspeed was increased from 20 to 25 KTAS. A similar longitudinal trim change was observed at the 290 azimuth at 25 KTAS SAS ON and 30 KTAS SAS OFF. These large aft longitudinal trim changes were not observed at the 310 or 280 azimuths. The SAS ON handling qualities in region A from 290 degrees to 120 degrees were improved from the standard OH-58C (ref 10). The low speed handling qualities of the JOH-58C aircraft in Region A with SAS ON are satisfactory.

Region B:

26. In rearward flight (Region B), SAS ON handling qualities ratings were improved from HQRS 5 (standard OH-58C) to HQRS 3 to 4. Only occasional moderate directional control inputs (±1/4 to 1/2 inch) were required to maintain the desired performance criteria (para 24). Excessive pitch and yaw excursions in rearward flight in the standard OH-58C were previously reported as a deficiency (ref 10). The pilot workload in the directional axis (as indicated by directional control excursions) with the SAS ON was significantly reduced in the JOH-58C. The maximum workload occurred at the 225 azimuth at 25 KTAS (fig. E-170). The high pilot workload in the longitudinal axis (±1 inch longitudinal cyclic inputs) at the 225 degree azimuth from 10 to 20 KTAS

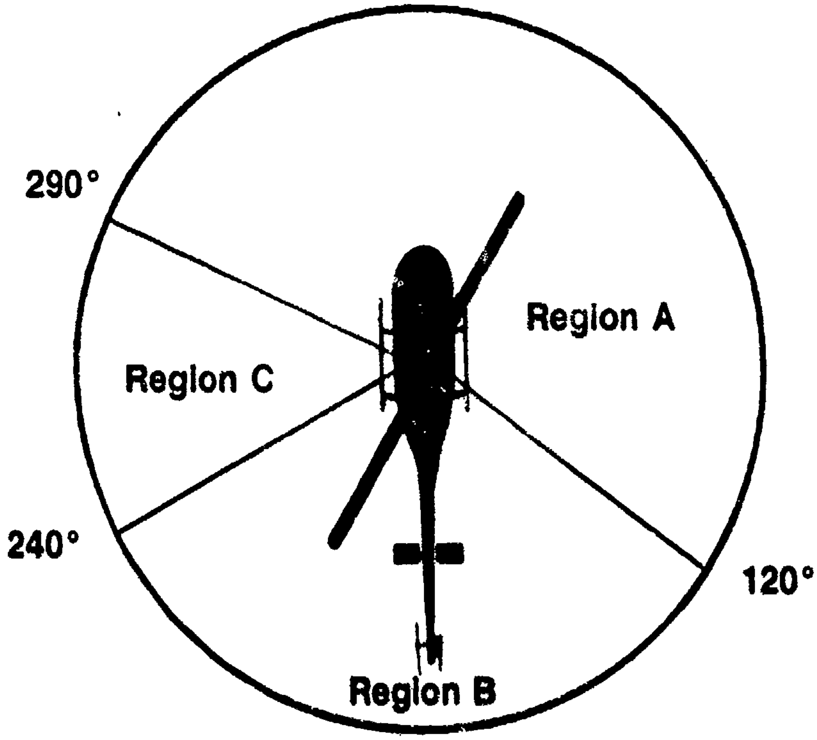


Figure A. Low Speed Flight Regions

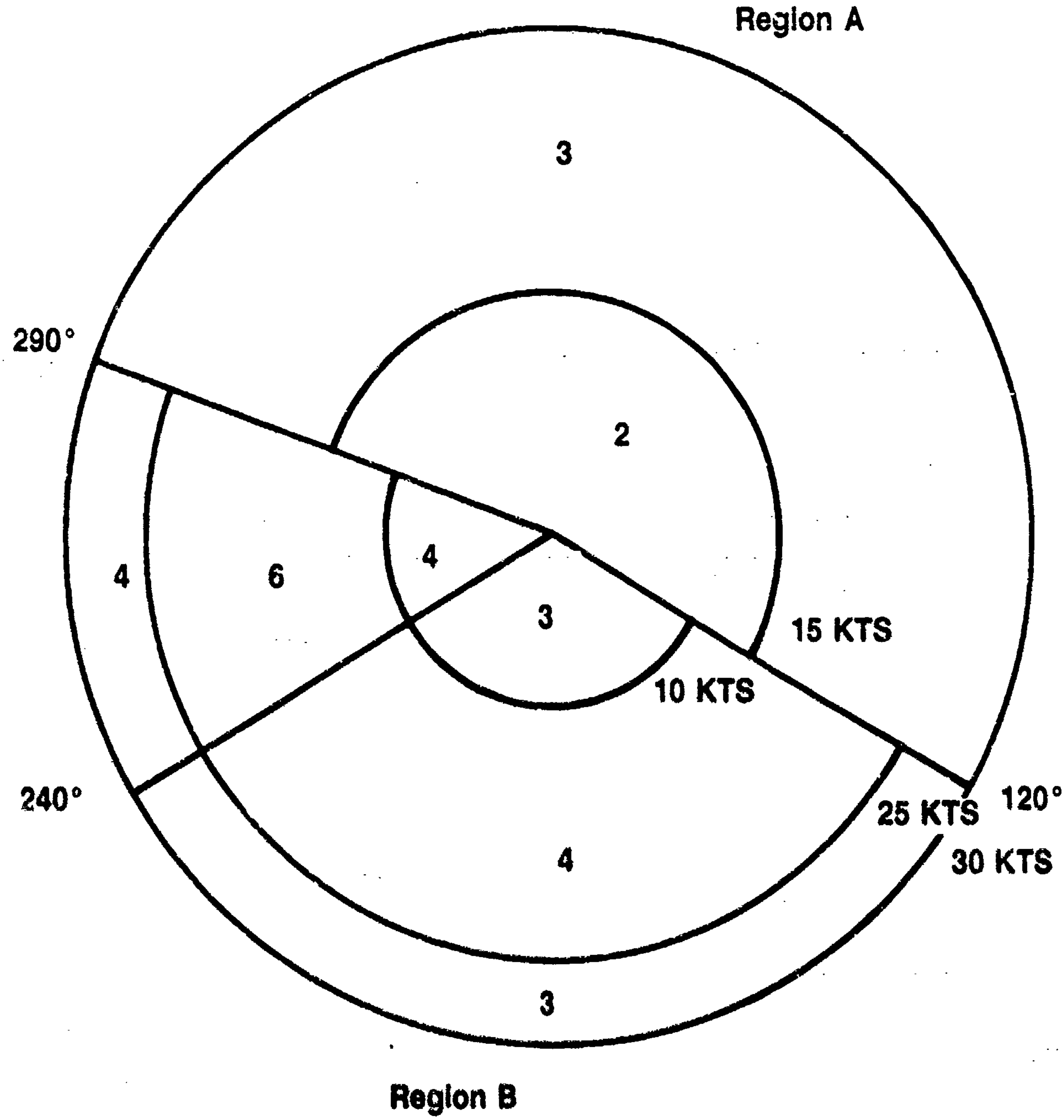


Figure B. SAS ON HQR Summary for Low Speed Flight

was similar to that reported in rearward flight in the standard OH-58C. Additionally, a large aft longitudinal cyclic trim change was required to maintain a 5 knot speed increase above 10 KTAS. The high pilot workload in the longitudinal axis in rearward flight from 10 to 20 KTAS is a shortcoming. Consideration should be given to installation of a SAS in more than one axis to improve the rearward flight handling qualities of the JOH-58C.

27. In addition to evaluating handling qualities in steady heading, constant airspeed flight, the following technique was used to simulate hovering turns in winds. Yaw rates of approximately 10 degrees/second and 20 degrees/second were established prior to entering the weathercock stability region (region B); then, directional and collective controls were fixed until recovery was initiated at the region boundary. Data are presented in figures E-193 through E-208. The limited authority (7% of full control travel) directional SAS was saturated at yaw rates greater than 6 degrees/second. Consequently, SAS was saturated at the initial trim conditions for these tests. Current Aircrew Training Manual (ATM) (ref 11, app A) standards require constant rate hover turns not to exceed 22.5 degrees/second. SAS would be almost continuously saturated during hover turns operationally.

28. Right yaw rates at 10 KTAS with SAS ON or OFF resulted in a continued right yaw rate which decreased to approximately 5 degrees/second when passing the 180 degree relative azimuth. Upon reaching the 160 degree azimuth, a rapid right yaw acceleration occurred which resulted in a yaw rate of approximately 50 degrees/second at the recovery azimuth of 120 degrees. Recovery at the 120 degree azimuth with a right yaw rate of 50 degrees/second (slowest observed) resulted in a 10 degree overshoot with SAS ON. Recoveries at the 120 azimuth were not further attempted due to the increased torque requirements and possibility of a main transmission overtorque. The recovery technique developed to prevent overtorque was to increase left pedal gradually, arresting the yaw rate at 360 degree azimuth (aircraft aligned in the direction of travel). At 15 KTAS, a 10 degrees/second right yaw rate with SAS ON and 20 degrees/second rate SAS ON or OFF were similar to the response at 10 KTAS. However, the 10 degree/second right yaw rate with SAS OFF resulted in the yaw rate decreasing to zero at approximately 230 degrees relative azimuth, then an accelerating left yaw rate developed which was arrested easily at the 360 degree relative azimuth. At 20 KTAS, a 20 degree/second right yaw rate with SAS ON resulted in a response similar to the response at 10 KTAS. All other initial right yaw rates at 20 KTAS SAS ON and OFF resulted in a slight overshoot of the 240 degree azimuth followed by an accelerating left yaw rate which was easily arrested as the aircraft aligned in the direction of travel. No attempt to recover the resultant left yaw rate was made prior to the 360 degree relative azimuth. SAS appeared to assist in maintaining trim yaw rate as evidenced by the delayed onset of the resultant left yaw rate which occurred with increasing airspeeds. During this test, large cyclic trim changes were required to maintain desired speed. Passing from 210 through 150 degrees relative azimuth required approximately 2 inches of aft cyclic followed by approximately 2 inches of forward cyclic at the 120 degrees relative azimuth. An additional 1 to 2 inches of forward cyclic were used during recoveries in the direction of travel to maintain desired speed. Although SAS remained saturated through most of this test, the limited authority directional SAS appeared to assist in maintaining desired trim conditions. While attempting to maintain a constant turn rate in a right pedal spot turn,

with SAS ON, in winds of 10 to 12 knots, the pilot was frequently required to make left and right, moderate (±1/4 to 1/2 inch) pedal inputs and occasionally required to make large (±1 inch) pedal inputs (HQRS 5). The longitudinal cyclic trim change required to remain within 2 feet of a spot during a pedal turn was large (±3 inches). Low speed flight effects on right yaw rates in the weathercock stability region were rapid right yaw accelerations from the 150 to 120 degree azimuths and decreasing right yaw rates from the 240 to 150 degree azimuths.

29. Left yaw rates SAS ON or OFF resulted in progressively increasing left yaw rates from 120 to 210 degrees. An extremely rapid left yaw acceleration occurred at the 210 azimuth. At 16 KTAS, recovery was accomplished at 10 degrees beyond the region boundary SAS ON and OFF. During application of right pedal to arrest yaw rate, a rapid, approximately 10 degree nose down pitch occurred. Recovery at the region boundary with speeds greater than 10 KTAS was not attempted due to the large (greater than ±30 percent) torque changes required and rapid pitch rate observed during recovery at 15 KTAS SAS ON. Instead, recovery was initiated at the region boundary and was completed by the 360 degree azimuth (direction of travel). No significant differences were noted SAS ON or OFF above 10 knots. At airspeeds greater than 10 KTAS and at the instant the yaw acceleration at the 210 azimuth was experienced, the Master Caution and Engine Oil Bypass Lights illuminated for approximately 1 second. Although the engine oil reservoir was fully serviced, severe sloshing of the oil probably caused activation of the caution lights. During left hover spot turns in winds of 10 to 12 knots, multiple left and right pedal inputs (±1/2 inch) were required in an attempt to maintain a constant turn rate with SAS ON. As the aircraft approached the 090 degree relative azimuth, larger (1 inch) left pedal inputs were required in an attempt to maintain the turn. Approaching the 210 degree relative azimuth required larger (1 inch) right pedal inputs to prevent an accelerating left turn. Throughout the maneuver, large longitudinal cyclic trim changes were required to remain within 2 feet of the spot. Low speed flight effects on left yaw rates in the weathercock stability region were increasing left yaw rates from the 120 to 210 degree azimuths and rapid left yaw acceleration from the 210 to 240 degree azimuth.

Region C:

30. In left sideward flight (Region C) yaw attitude excursions of ±6 degrees observed in the standard OH-58C (reported deficiency, ref 10, app A) were reduced in the JOH-58C with SAS ON. HQRS for 15 to 25 KTAS were HQRS 6 (compared to HQRS 7 in the standard OH-58C), while all other speeds improved to HQRS 4. Moderate pitch, roll, and yaw excursions required moderate-sized control inputs to accomplish the simulated hover task. However, smaller and less frequent pedal inputs were required as compared to the standard OH-58C. Critical azimuths and airspeeds, determined by pilot workload, were 240 to 280 degrees at 15 to 25 KTAS. Large SAS actuator inputs as well as moderate-sized, frequent control inputs in all axes (±1/4-inch directional and ±1/2-inch lateral and longitudinal) were required to achieve only adequate performance (HQRS 6). The directional SAS, improved tail rotor system, and engine droop kit moderately improved the low speed flight characteristics of the JOH-58C in Region C, however, workload remains high at the critical azimuths and airspeeds. The moderate pitch, roll,

and yaw excursions between 15 and 25 KTAS at relative wind azimuths between 240 and 280 degrees are a shortcoming.

All Regions with SAS OFF:

31. Low speed SAS OFF flight data are presented in figures E-159 through E-189. Larger and more frequent control inputs were required for all azimuths and airspeeds tested than were required with SAS ON. Qualitatively and quantitatively the directional control was more sensitive than the standard OH-58C. Except for increased directional sensitivity, the handling qualities of the JOH-58C with SAS OFF were similar to the standard OH-58C.

Trim Changes with Power Effects

32. Trim directional control requirements as a function of power were evaluated in an attempt to determine the conditions resulting in main rotor disc vortex interference with the tail rotor. Tests were conducted at the conditions listed in table 1. Results are presented in figures E-209 through E-216. Generally, decreasing engine power required increasing right directional control at all trim airspeeds and sideslips. At all trim airspeeds and sideslips, directional trim changes at 80% and 35% engine torque were accompanied by large (±10 degrees) sideslip excursions and required restabilizing on desired trim sideslip prior to further power reduction. The characteristic directional trim changes for right sideslips were similar at all airspeeds and power settings. The characteristic directional trim changes for left sideslips showed increasing left pedal requirements with decreasing airspeed at all power settings. Though accuracy of sideslip beyond 35 degrees and airspeed below 30 KCAS could not be determined due to instrumentation limitations, a significant directional trim discontinuity was observed at 20 KCAS with approximately 40 degrees left sideslip. Rapid right yaw accelerations requiring frequent large (1 inch) pedal inputs to remain ±10 degrees of desired sideslip occurred between 70 and 85% engine torque. Buffeting of the tail was felt by the pilot through the airframe. The right yaw accelerations and buffeting did not occur below 70% engine torque. No engine torque setting above 85% was attempted due to the possibility of main transmission overtorque when arresting the right yaw accelerations. On a subsequent flight, this significant trim discontinuity was not observed under similar conditions. Figure E-216 shows a time history of this occurrence. Directional trim changes with power did not provide sufficient data to determine the area of main rotor disc vortex interference with the tail rotor. Recommend alternate methods of determining main rotor vortex interference be investigated using more accurate measurements of low airspeed, sideslip, and tail boom loads.

Mission Maneuvering Characteristics

33. Mission maneuvers were qualitatively evaluated in the JOH-58C at the conditions listed in table 1. Time histories of some maneuvers are presented in figures E-217 through E-254. The maneuvers were conducted in accordance with the OH-58 helicopter ATM (ref 11, app A) and were evaluated SAS ON and OFF. Pilot workload increased with the SAS OFF for all maneuvers conducted. Aircraft controllability was not in question, but SAS OFF flight required increased pilot compensation to maintain the ATM

standards of each maneuver. SAS ON flight, however, reduced pilot workload which enhanced mission capability. Slope landings, masking/unmasking and nap-of-the-earth flight were easier to accomplish in the JOH-58C than in the standard OH-58C because rate damping reduced aircraft yaw attitude excursions. Hovering in actual winds was moderately improved with SAS ON. The occasionally saturated SAS resulted in moderate yaw excursions at the critical azimuth from 15 to 25 KTAS. An OGE hover spot turn of approximately 10 degrees/second to the left resulted in a rapid left yaw acceleration when passing the 270 degree relative azimuth. Approximately 2 inches of right pedal were required to arrest the increasing yaw rate. The mission maneuver characteristics of the JOH-58C helicopter with a directional SAS improved mission capability. The limited authority (7% of full control travel) directional SAS was occasionally saturated during hover with a left crosswind and always saturated during maneuvers requiring yaw rates greater than approximately 6 degrees/second.

Directional SAS Effects

34. The effect of a directional SAS was to provide increased yaw rate damping which improved aircraft gust response (paras 13 and 16). However, the limited authority SAS saturated at low (6 degrees/second) yaw rates. The characteristic of the hovering aircraft with wind in the weathercock region is rapid yaw accelerations SAS ON and OFF from 150 to 120 and 210 to 240 relative wind azimuths (paras 26 and 27). In the region of tail rotor vortex ring state the aircraft demonstrated moderate pitch, roll, and yaw excursions with SAS ON and OFF (para 28). Sufficient data to define the area of main rotor disc vortex interference with the tail rotor were not obtained (para 32). Additionally, the small power margin remained a significant factor when arresting yaw rates despite testing at weights below 3000 lb (maximum gross weight is 3200 lb) and low density altitudes. The concept of a SAS which damps uncommanded yaw rates demonstrates potential for reducing the conditions conducive to LTE. However, the limited authority (7% or full control travel) directional SAS saturated at small yaw rates (6 degrees/second) and did not significantly reduced the characteristic high yaw rates of moderate yaw attitude excursions observed in the JOH-58C.

MISCELLANEOUS

Cockpit Evaluation

35. The ease of the inadvertent main transmission overtorque or engine overtemperature condition was previously reported as a shortcoming (ref 10, app A). With the improved tail rotor and engine droop modifications applied, the aircraft is more responsive to pedal or directional SAS inputs. Consequently, with the pilot's attention directed outside the cockpit during NOE flight, an increased engine and tail rotor response will result in an increased possibility of an overtorque or overtemperature condition. The ease of main transmission overtorque or engine overtemperature condition in the OH-58C remains a shortcoming in the JOH-58C.

Aircraft Pitot-Static System Calibration

36. The helicopter pitot-static system was calibrated in level flight, climbs, and autorotations using the trailing bomb technique. Data are presented in figure E-255. The position error of the JOH-58C helicopter was similar to the standard OH-58C. The JOH-58C ship airspeed system was satisfactory.

CONCLUSIONS

GENERAL

37. The following conclusions were reached upon completion of testing.

a. The limited authority SAS will not significantly reduce the conditions conducive to encountering LTE.

b. The limited authority directional SAS does not significantly reduce the characteristic high yaw rates and moderate yaw attitude excursions in the JOH-58C.

c. The flying qualities of the JOH-58C were moderately improved in comparison to the standard OH-58C.

d. The concept of SAS which damps uncommanded yaw rates demonstrates potential for reducing the conditions conducive to LTE.

SHORTCOMINGS

38. The following shortcoming was previously identified as a deficiency in the standard OH-58C: Moderate pitch, roll, and yaw excursions between 15 and 25 KTAS at relative wind azimuths between 240 and 280 degrees (para 30).

39. The following shortcoming was previously reported as high pilot workload: The high pilot workload in the longitudinal axis in rearward flight at 10 to 20 KTAS (para 26).

40. The following shortcomings were previously identified in the OH-58C and remain shortcomings:

a. Ease of main transmission overtorque or engine overtemperature condition (para 35).

b. The high control sensitivity resulting in directional overcontrol (para 22).

c. Pitch up divergence ("dig in" tendencies) at load factors near 1.4g at 64 KCAS (para 11).

d. Large longitudinal and lateral trim control displacement bands (para 8).

SPECIFICATION COMPLIANCE

41. The JOH-58C failed to meet the requirement of paragraph 3.3.10 of MIL-H-8501A in that there were no positive self-centering characteristics for the directional control system (para 9).

RECOMMENDATIONS

42. The following recommendations were made:

a. The shortcomings reported in paragraphs 38, 39, and 40 should be corrected as soon as possible.

b. Consideration should be given to installation of a SAS in more than one axis to improve the rearward flight handling qualities of the JOH-58C (para 26).

c. Alternate methods of determining main rotor vortex interference should be investigated using more accurate measurements of low airspeed, sideslip, and tailboom loads (para 32).

APPENDIX A. REFERENCES

1. Final Report, AEFA Project No. 83-12, *Government Pilot Evaluation of the BHTI 206/Ring Fin Tail Rotor,* January 1985.

2. Final Report, AEFA Project No. 83-15, *Preliminary Airworthiness Evaluation of the OH-58C with 3-Axis Stability Control Augmentation System and Improved Tail Rotor,* October 1983.

3. Final Report, AEFA Project No. 85-03, *Airworthiness and Flight Characteristics of the JOH-58C (OH-58X Surrogate Helicopter),* February 1986.

4. Letter, AVSCOM, AMSAV-8, 29 December 1986, subject: Loss of Tail Rotor Effectiveness (LTE) Evaluation of the OH-58C with Directional SCAS ONLY Operable. (Test Request)

5. Test Plan, AEFA Project No. 86-22, *Loss of Tail Rotor Effectiveness (LTE) Evaluation of the OH-58C with Directional SCAS,* January 1987.

6. Operator's Manual, TM 55-1520-235-10, *Army OH-58C Helicopter,* 7 April 1978, with change 40, 21 November 1986.

7. Letter, AVSCOM, AMSAV-E, 23 January 1987, with revision 4 dated 15 June 1987, subject: Airworthiness Release for JOH-58C, S/N 70-15349 for the Directional SCAS/Tail Rotor Boost Evaluation and HICAP Instrumentation Evaluation.

8. Military Specification, MIL-H-8501A, *Helicopter Flying and Ground Handling Qualities; General Requirements for,* 7 September 1961, with amendment 1, 3 April 1962.

9. Flight Test Manual, Naval Air Test Center, FTM No. 104, *Stability and Control,* 10 November 1983.

10. Final Report, AEFA Project No., 76-11-2, *Airworthiness and Flight Characteristics Evaluation of the OH-58C Interim Scout Helicopter,* April 1979.

11. Aircrew Training Manual (ATM), FC1-215, *Observation Helicopter OH-58,* 30 October 1984.

12. Aviation Unit and Intermediate Maintenance Manual, *OH-58A and OH-58C,* TM 55-1520-228-23-1, dated 4 August 1978, with change 39, 1 December 1985.

APPENDIX B. AIRCRAFT DESCRIPTION

1. The test helicopter, JOH-58C US S/N 70-15349, was a standard OH-58C (built by Bell Helicopter Textron, Inc. (BHTI)), modified with a SFENA directional Stability Augmentation System (SAS). The standard OH-58C has a single two-bladed, semirigid, teetering main rotor and a single two-bladed, delta-hinged, semirigid, teetering tail rotor. A detailed description of the OH-58C is included in the operator's manual (ref 6, app A). The major aircraft modifications included the Bell 206L-3 tail rotor (65 in. diameter) with accompanying drive shafting and gearbox (modification work order (MWO) 55-1520-228-50-25), the engine droop kit (MWO 55-1520-228-50-26), and the directional SAS. Figure B-1 shows the test aircraft. Figures B-2 and B-3 show the SAS cockpit controls. Figure B-4 shows the internally mounted test instrumentation.

2. The test helicopter was weighed by the U.S. Army Aviation Engineering Flight Activity (AEFA) personnel prior to testing. The weight and longitudinal center of gravity (cg) data were 2313/114.49, no fuel and 2770/114.87 full fuel.

3. A complete flight control rigging check was performed by AEFA quality control personnel prior to the initiation of testing. All flight control rigging was within tolerances specified in reference 7, appendix A. The data for the tail rotor rigging check is presented below:

Tail Rotor	Left	22 degrees 54 minutes
	Right	-8 degrees 36 minutes

Rigging was accomplished in accordance with the rigging procedures specified in reference 12 except that hydraulic power was applied, the directional SAS actuator was centered, and electrical power was OFF.

4. The improved tail rotor (MWO 55-1520-228-50-25) is depicted in figure B-5. It incorporates the same airfoil section as the standard OH-58C tail rotor but the diameter is increased by 3 inches to 65 inches. Maximum pitch angle values are increased to the values shown in paragraph 3. The tail rotor drive shafting and gearbox were changed per the MWO. The drive shaft is a seven piece shaft (fig. B-6). Each piece in the shaft is identical and has a larger diameter than the one-piece standard drive shaft. The tail rotor gearbox continuous rating is increased from 65 to 85 shaft horsepower.

5. The JOH-58C had a limited-authority (7% of full control travel), prototype single-axis SAS. The SAS uses a rate gyro computer and actuator to provide rate damping in the directional axis. No attitude retention or attitude hold feature was included in the system tested. Force trim was not provided in the directional controls. The directional SAS includes the following components:

Figure B-1. Test Aircraft

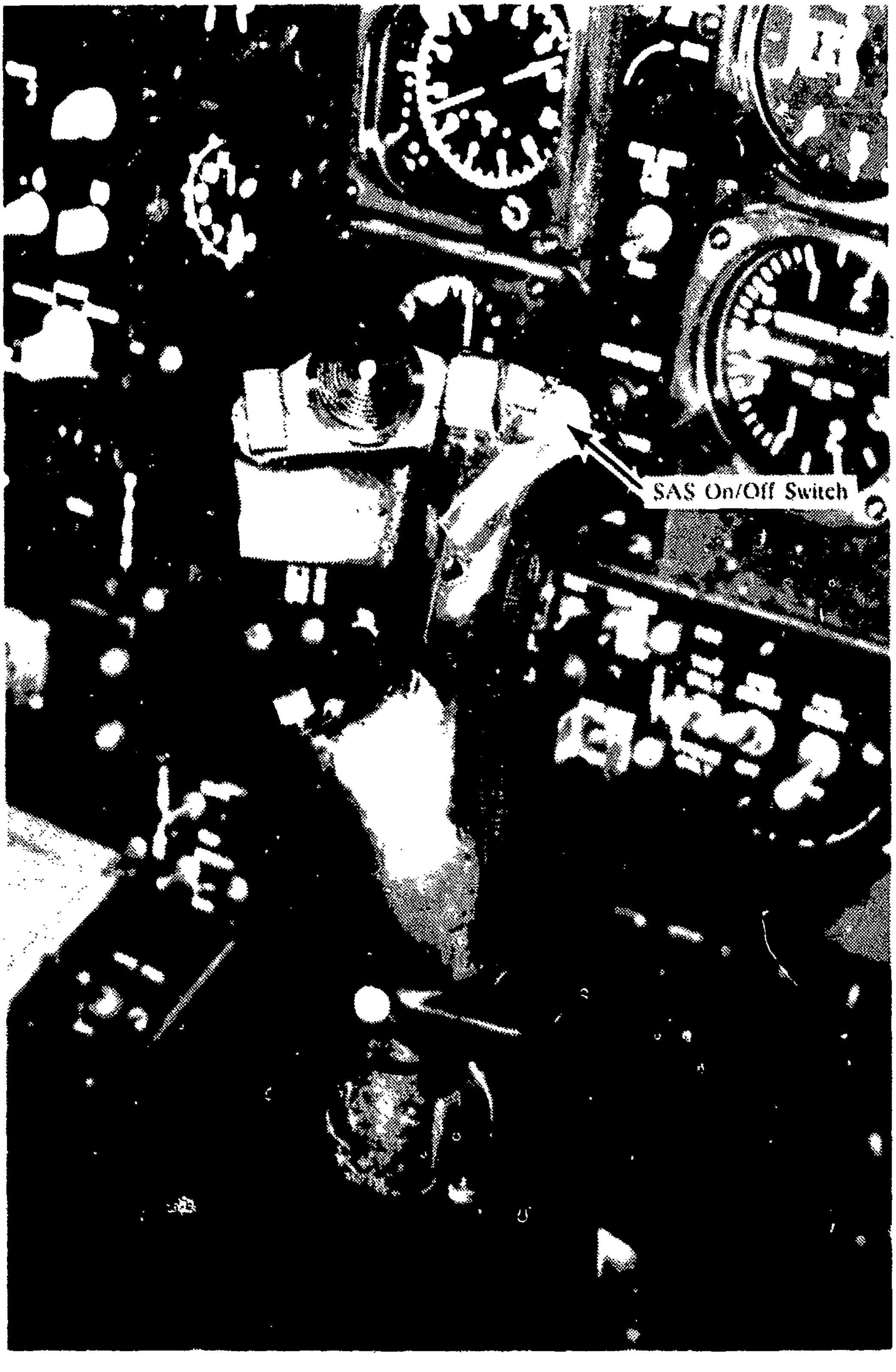


Figure B-2   Cyclic Grip with SAS On/Off Switch

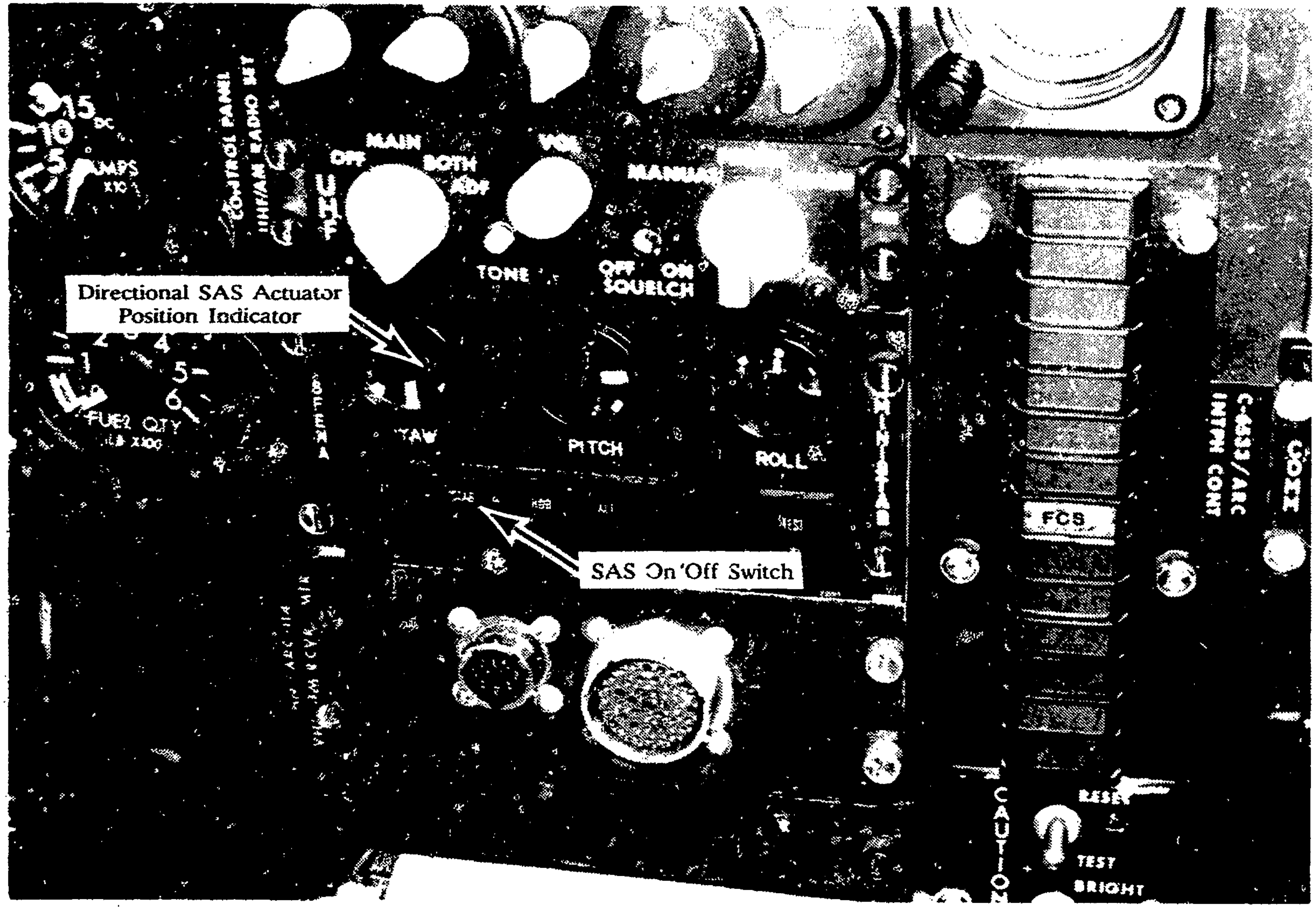


Figure B-3. Instrument Panel SAS Controls

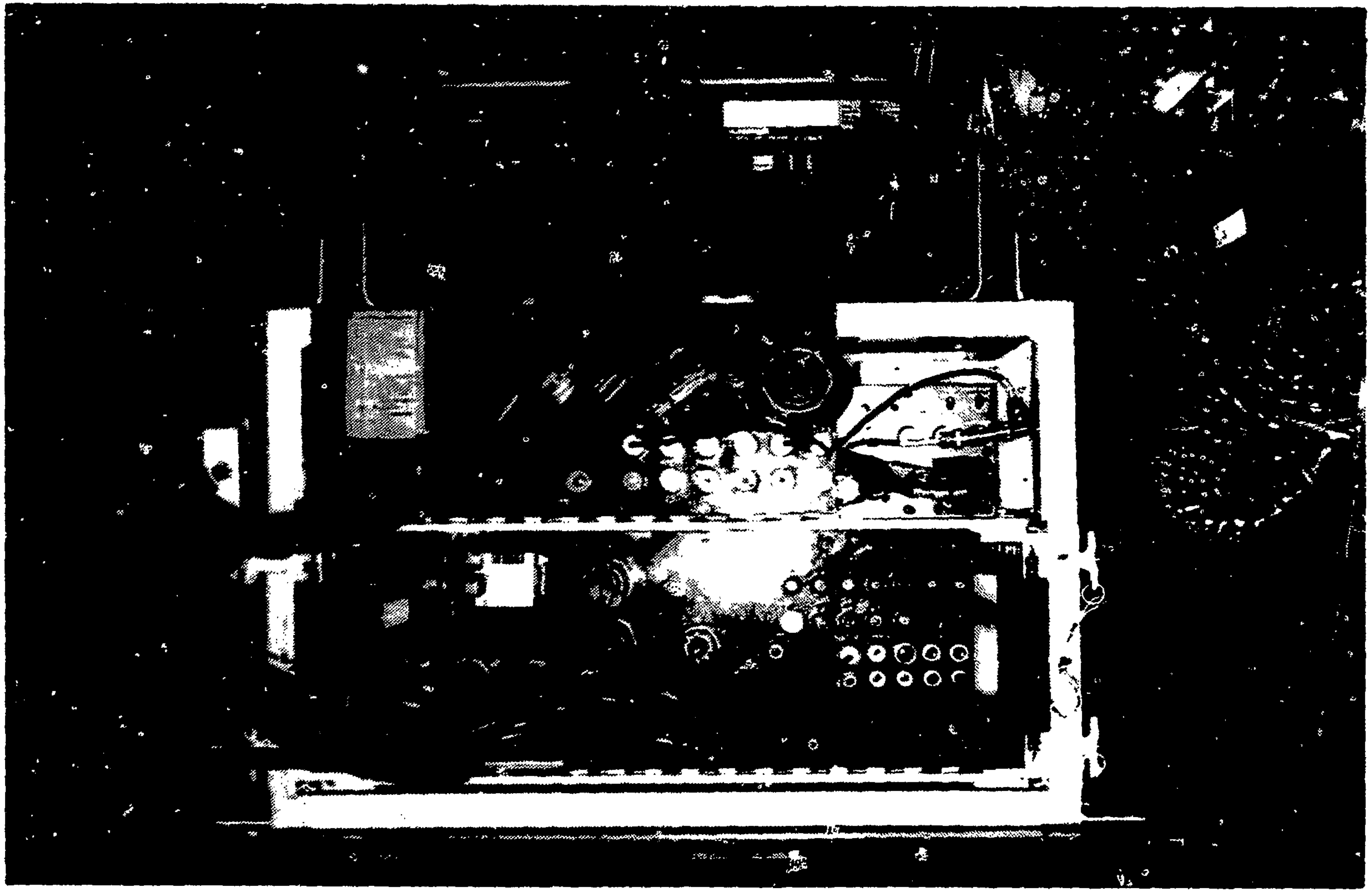


Figure B–4. Test Instrumentation Installation

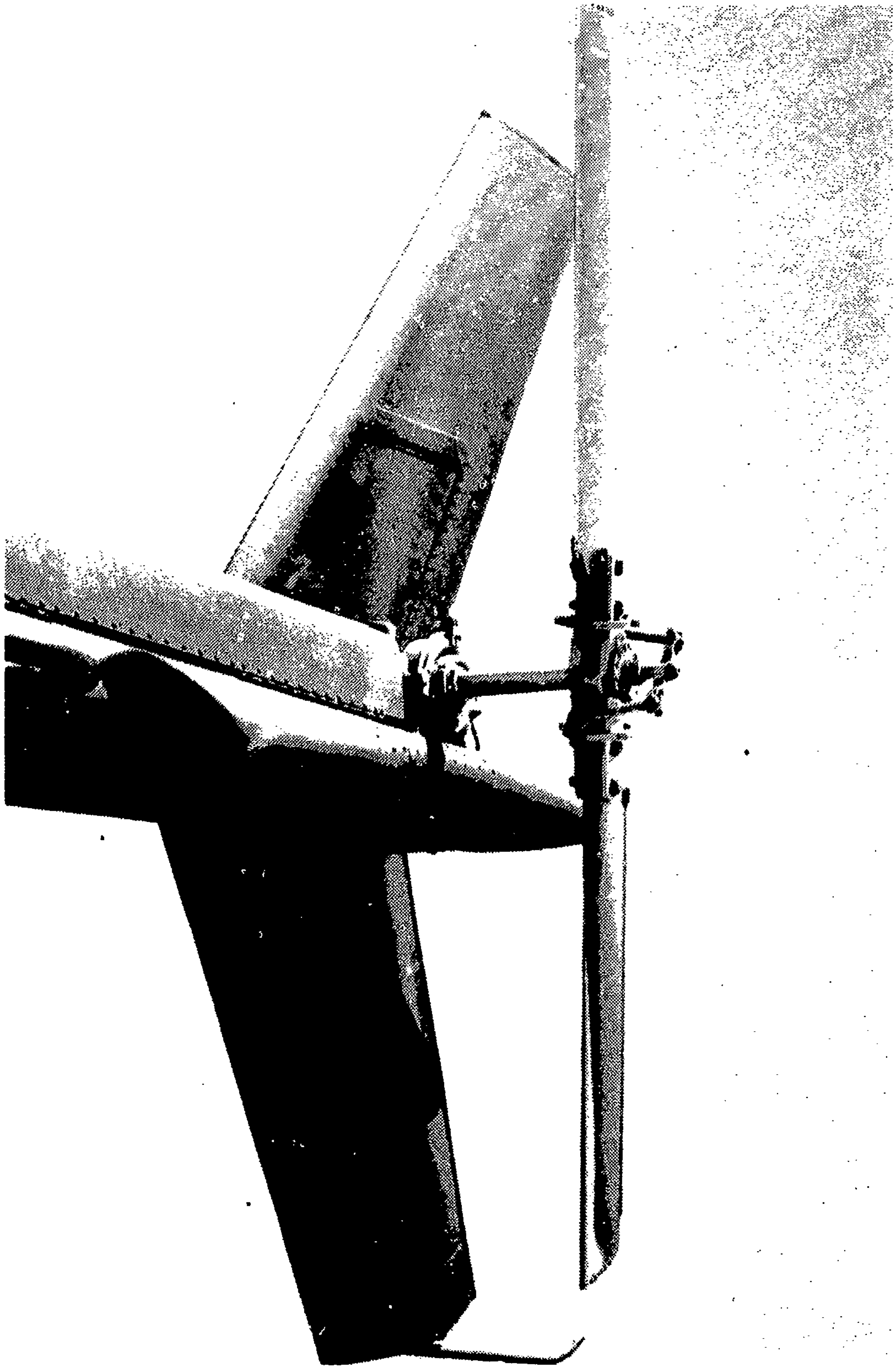


Figure B-5. Improved Tail Rotor

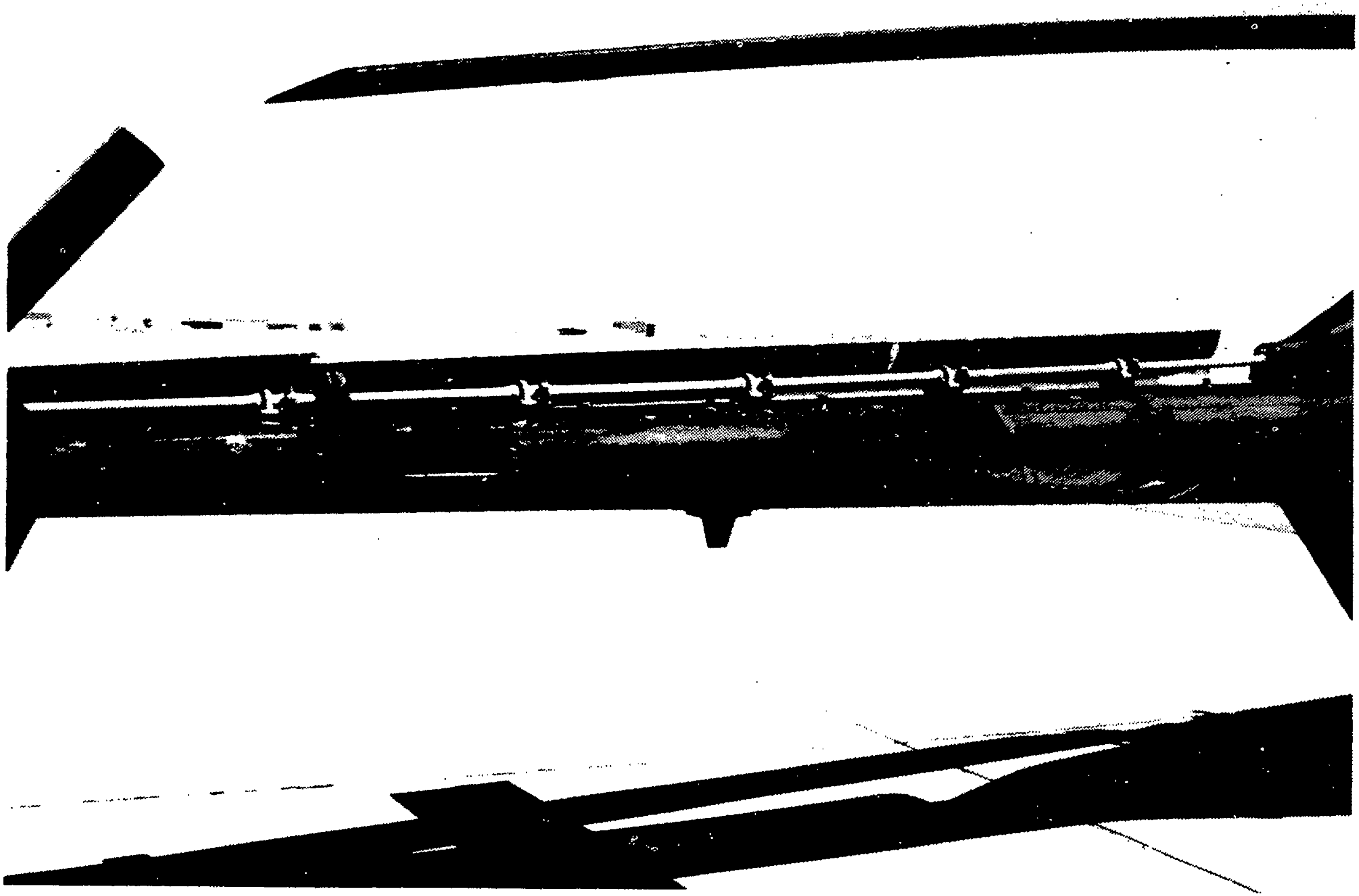


Figure B–6. Tail Rotor Drive Shaft

ITEM	PART NUMBER	QUANTITY	LOCATION
SAS Computer	75258V1M2	1	Avionics Compartment
Directional rod/ actuator assy	10110-001	1	Entrance to tail boom
Air data computer	10980-002	1	Passenger compartment
Junction Box	153-51219-30C	1	Passenger compartment
Yaw Stop Assy	11530	1	Entrance to tail boom
SAS control panel	K28AJM	1	Instrument panel
Pre-Fabricated Harness yaw	11368	1	Passenger compartment
50 VA Inverter	PC 50	1	Under pilot's seat
Hydraulic/boosted T/R/Assy	206-001-739-7	1	Entrance to tail boom
Actuator Position Indicator	X60ACM	1	Instrument Panel

These components were designed for the SFENA 3-axis SAS and therefore the connections were modified for the directional-only configuration.

6. A SAS computer for the directional axis incorporates logic and gain networks to provide rate damping. A rate gyro in the computer senses changes of angular rate of 0.01 degree/second.

7. The SAS control panel is shown in figure B-3. The panel includes a Force Trim button, a STAB button (SAS ON/OFF), a button to engage altitude hold and a system test switch. Only the STAB button was functional for this test. Directional SAS actuator position is indicated on the yaw galvanometer.

8. The SAS power distribution system requires 28V DC, 26V AC and 115V AC single-phase electrical power. The 115V AC, 400 Hz, single-phase power, provided by the upgraded solid state inverter, is for the rate gyro motor and for the computer internal power supplies. The rate gyro output signal is demodulated and applied to a servo amplifier which drives the rate (damping) channels. When the system is OFF, resulting in a zero signal to the servo amplifier, the actuator centers. The actuator is mounted in a directional control tube and contains a DC permanent magnet motor driven by a pulse-width modulating type of servo-amplifier. The ±27V motor drive voltage and the ±15V feedback pot excitation voltage are derived in the computer power supply.

9. The SAS uses a single actuator mounted in series with the directional control tubes. The actuator has low force output and is used in conjunction with the hydraulically boosted control. The actuator is installed as close as possible to the input valve of the hydraulic booster to isolate the actuator motion from the pilot controls. The mass and friction on the booster side of the actuator is low compared to the pilot's side of the actuator. The SAS actuator stroke is limited to give 6.79% (of full control travel) SAS authority (approximately ±0.34 in.).

10. A SAS ON/OFF switch is located on the pilot cyclic grip as shown in figure B-2. If the switch is depressed, SAS will engage or disengage.

11. The force trim system is the standard OH-58 force trim system. However, the force trim ON/OFF switch is relocated to the position shown in figure B-3. The thumb button

on the pilot/copilot cyclic stick (fig. B-2) is used for momentary force trim release. There is no force trim in the directional axis.

12. A flight control system (FCS) caution light is provided in the segmented caution panel. When the SAS is disengaged, the series actuator automatically centers and the FCS caution light illuminates momentarily. The FCS light does not illuminate, however, if a SAS failure occurs.

13. SAS operation is accomplished by pressing the STAB button on the SAS control panel or the SAS ON/OFF switch located on the pilot's cyclic grip. SAS operation is monitored using the yaw actuator position indicator (fig. B-3).

14. Prior to flight, a system self-test may be performed. With the SAS OFF, the TEST button is depressed. The test button should light the "1" on the test button. The STAB indicator will show green stripes, the ALT indicator will show red stripes. The FCS caution light will illuminate and the three actuator position indicators will be centered. Position "1" tests only the system indicators. When the TEST button is depressed a second time, the "2" illuminates. The STAB and ALT indicators are initially black. Position "2" tests the system amplifiers and input/output logic. When the STAB indicator is depressed, the green stripes reappear. FCS caution light remains illuminated and the actuator position indicators remain centered. When the test button is depressed a third time to the "0" position, the STAB indicator remains green, the FCS caution light extinguishes. The SAS is then operational for flight.

15. The SAS operates normally when the STAB button or the pilot's SAS ON/OFF switch on the cyclic is depressed. Green and white diagonal stripes appear in the STAB indicator, indicating that power is applied to the system and rate damping is in effect. Attitude retention was not incorporated in the system modified for this test.

16. The FCS caution light and master caution light illuminate momentarily when the SAS is disengaged. the FCS caution light does not illuminate when the SAS fails.

17. The SAS is disengaged by depressing the STAB button. The SAS can also be disengaged by depressing the SAS ON/OFF switch on the pilot's cyclic. Disengagement does not remove power from the system gyro computer.

APPENDIX C. INSTRUMENTATION

1. The test instrumentation system was designed, calibrated, installed, and maintained by the U.S. Army Aviation Engineering Flight Activity. Digital and analog data were obtained from calibrated instrumentation and were recorded on magnetic tape and/or displayed in the cockpit. The instrumentation system consisted of various transducers, signal conditioning units, a 12-bit pulse code modulation encoder, and an Ampex AR 700 tape recorder. Time correlation was accomplished with an onboard, recorded and displayed, Inter-Range Instrumentation Group B format time of day. Various specialized test indicators displayed data to the pilot and engineer continuously during the flight. A boom with the following sensors was mounted on the nose of the aircraft: swiveling pitot-static head, sideslip vane and angle-of-attack vane. The boom airspeed system calibration is shown in figure C-1.

2 The following parameters were displayed on calibrated instruments in the cockpit:

Airspeed (boom)
Airspeed (ship)
Altitude (boom)
Altitude (ship)
Rotor speed
Engine torque
Turbine outlet temperature
Fuel flow rate
Fuel used (totalizer)
Outside air temperature
Normal acceleration
Angle-of-sideslip
Time of day
Record counter

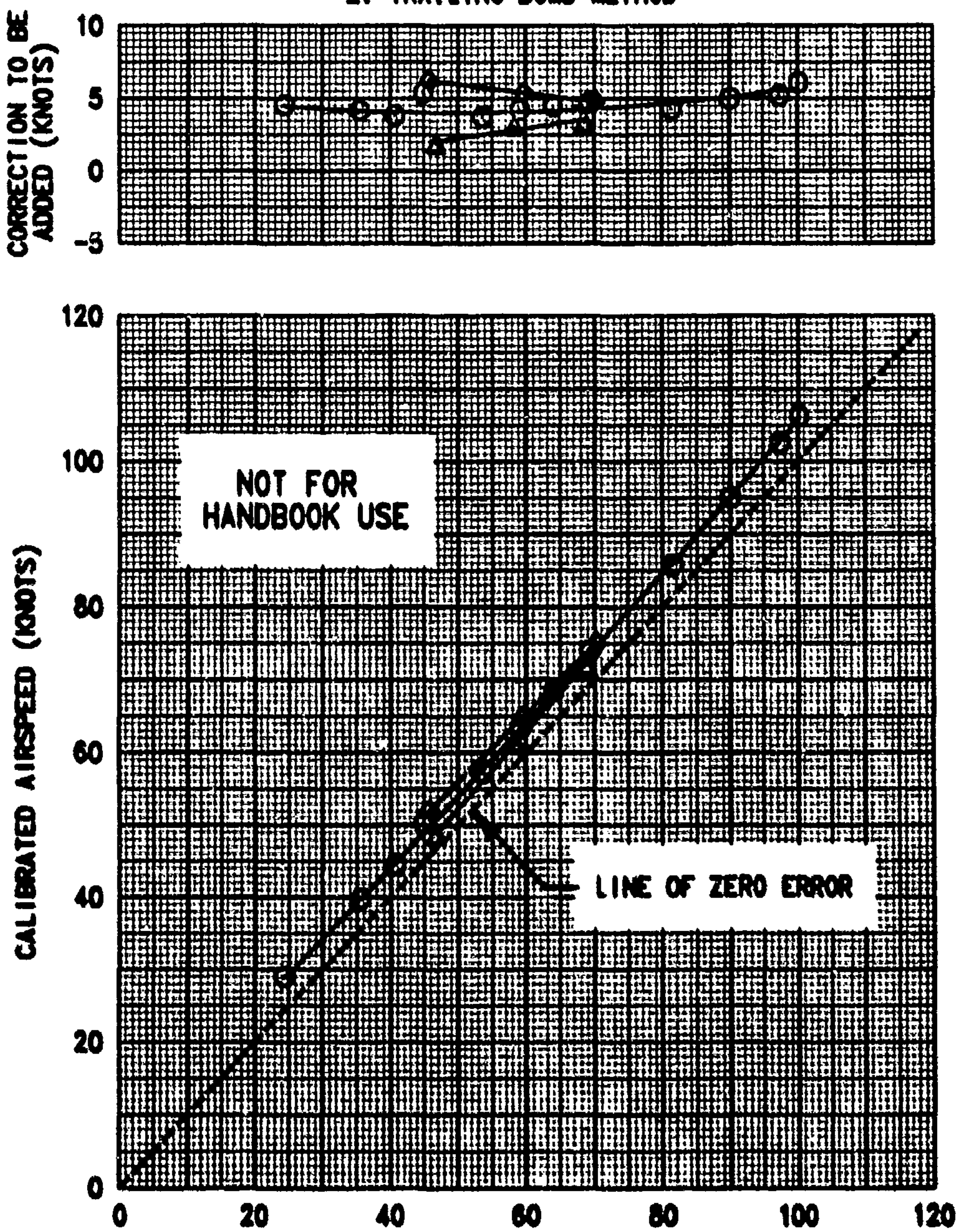
3. The following parameters were recorded on magnetic tape:

Time code
Record number
Fuel used
Airspeed (boom)
Altitude (boom)
Airspeed (ship)
Altitude (ship)
Main rotor speed
Outside air temperature
Angle-of-sideslip
Angle-of-attack
Engine torque
Turbine outlet temperature
Gas producer speed
Power turbine output shaft speed
Fuel flow rate

FIGURE C-1
BOOM SYSTEM AIRSPEED CALIBRATION
JOH-58C USA S/N 70-15349

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	FLIGHT CONDITION
⊙	2940	108.1	0.0	6020	20.5	354	LEVEL
◇	2880	107.8	0.0	5980	20.5	354	CLIMB
△	2900	107.9	0.0	5920	20.5	354	AUTOROTATION

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON
2. TRAILING BOMB METHOD



Control positions
- Longitudinal
- Lateral
- Directional
- Collective

Aircraft attitudes and rates
- Pitch
- Roll
- Yaw

Aircraft vertical center of gravity acceleration
Directional SAS actuator position

APPENDIX D. TEST TECHNIQUES AND DATA ANALYSIS METHODS

GENERAL

1. Stability and control data were collected and evaluated using standard test methods as described in reference 9, appendix A. Definitions of deficiencies and shortcomings used during this test are shown below.

a. Deficiency. A defect or malfunction discovered during the life cycle of an item of equipment that constitutes a safety hazard to personnel; will result in serious damage to the equipment if operation is continued; or indicates improper design or other cause of failure of an item or part, which seriously impairs the equipment's operational capability.

b. Shortcoming. An imperfection or malfunction occurring during the life cycle of equipment which must be reported and which should be corrected to increase efficiency and to render the equipment completely serviceable. It will not cause an immediate breakdown, jeopardize safe operation, or materially reduce the usability of the material or end product.

Airspeed Calibration

2. The boom and ship's pitot-static systems were calibrated using the trailing bomb method to determine the airspeed position error. Calibrated airspeed (V_{cal}) was obtained by correcting indicated airspeed (V_i) using instrument (ΔV_{ic}) and position (ΔV_{pc}) error corrections.

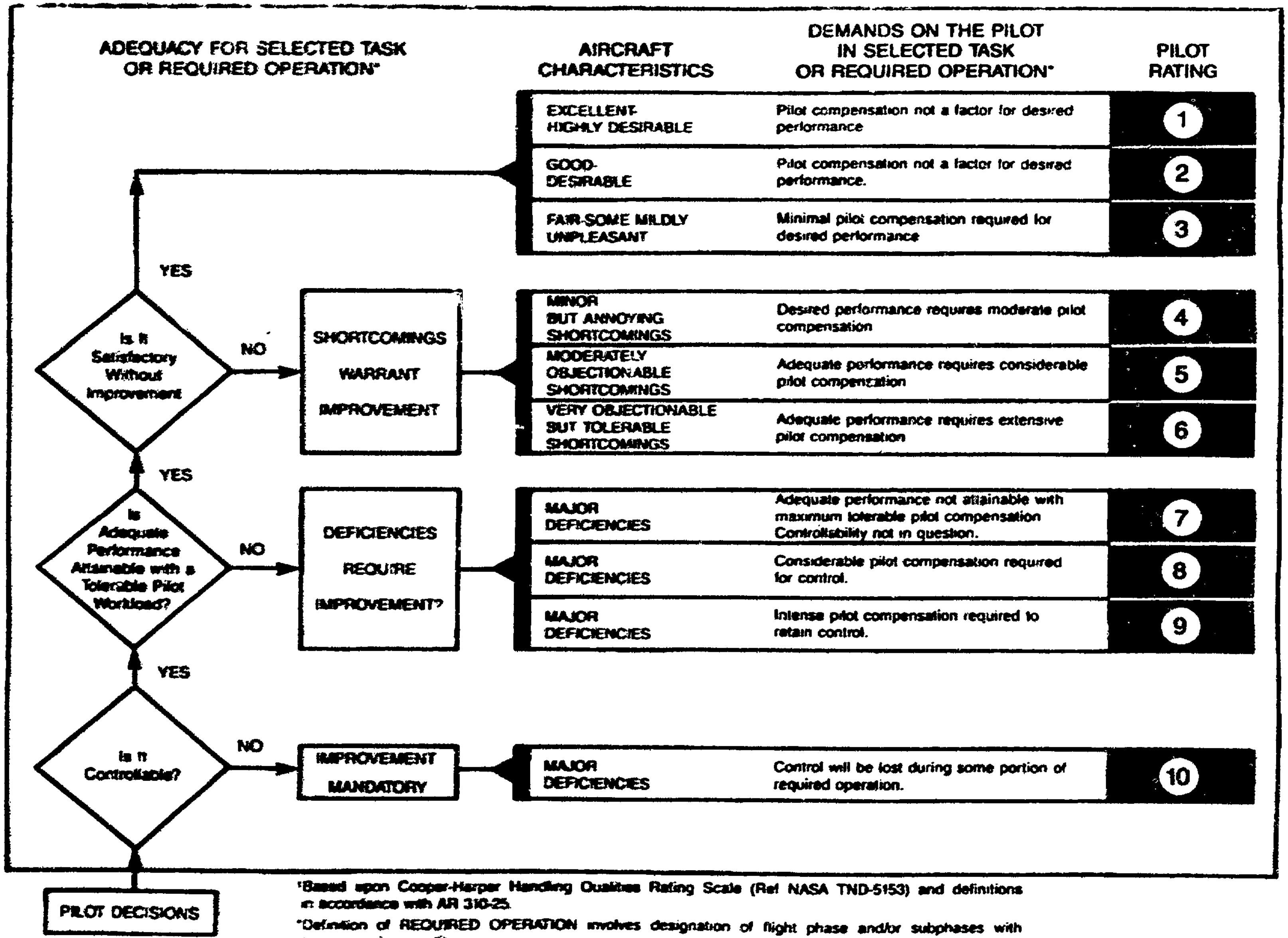
$$V_{cal} = V_i + \Delta V_{ic} + \Delta V_{pc} \qquad (1)$$

Aircraft Weight and Balance

3. Prior to testing, the aircraft gross weight and center of gravity (cg) location were determined using calibrated scales. The aircraft was weighed with full instrumentation onboard and without fuel. The aircraft weight was 2313 pounds with a longitudinal cg location at fuselage station 114.49. A fuel cell, site gage, and cockpit fuel gage calibration was accomplished. The fuel weight for each test flight was determined prior to engine start by using the calibrated sight gage.

4. The Handling Qualities Rating Scale presented in figure D-1 was used to augment pilot comments relative to handling qualities and workload.

5. The Vibration Rating Scale presented in figure D-2 was used to augment pilot comments relative to vibrations.



*Based upon Cooper-Harper Handling Qualities Rating Scale (Ref NASA TND-5153) and definitions in accordance with AR 310-25.

*Definition of REQUIRED OPERATION involves designation of flight phase and/or subphases with accompanying conditions

Figure D–1. Handling Qualities Rating Scale

DEGREE OF VIBRATION	DESCRIPTION[1]	PILOT RATING
No vibration		0
Slight	Not apparent to experienced aircrew fully occupied by their tasks, but noticeable if their attention is directed to it or if not otherwise occupied.	1, 2, 3
Moderate	Experienced aircrew are aware of the vibration but it does not affect their work, at least over a short period.	4, 5, 6
Severe	Vibration is immediately apparent to experienced aircrew even when fully occupied. Performance of primary task is affected or tasks can only be done with difficulty.	7, 8, 9
Intolerable	Sole preoccupation of aircrew is to reduce vibration level.	10

[1]Based on the Subjective Vibration Assessment Scale developed by the Aeroplane and Armament Experimental Establishment, Boscombe Down, England.

Figure D-2. Vibration Rating Scale

HANDLING QUALITIES

Control System Characteristics

6. These tests were conducted on the ground with hydraulic and electrical power provided by ground power units. A hand-held force gauge was used to measure the force required to move the cyclic control in incremental displacements to the limits of travel. Hysteresis was checked by taking measurements in the increasing and decreasing force directions. The force gauge was also used to measure the force required to move the directional and the collective controls in incremental displacements to the limits of travel in both directions.

Static Lateral-directional Stability

7. These tests were accomplished by trimming the aircraft in coordinated flight at the desired conditions. With collective control fixed, the aircraft was then stabilized at incremental sideslip angles up to 20 degrees left and right of trim while maintaining steady heading at the trimmed airspeed.

Maneuvering Stability

8. The variation of longitudinal control position and force with normal acceleration was determined during steady turns. The test consisted of incrementally increasing normal acceleration (load factor) while holding collective position constant. Steady turns, in both directions, were accomplished by stabilizing and trimming in level unaccelerated flight at the desired test airspeed. Load factor was increased by incrementally increasing bank angle. Ball-centered, constant airspeed, and fixed collective control were maintained during the turn. Rotor speed was not adjusted during the turn. Data were gathered within 1000 feet of the specified test altitude.

Dynamic Stability

9. These tests consisted of evaluating both the short-term and long-term responses of the aircraft. The tests were performed with the directional stability augmentation system (SAS) ON and OFF. Short-term response testing was accomplished by left and right directional control pulse inputs. The pulse input was obtained by rapidly displacing the control approximately 1 inch, holding for 0.5 second, then rapidly returning to the trim position and holding until aircraft motions were damped or recovery was required. All other controls remained fixed during forward flight tests. Trim conditions for low-speed dynamic stability tests were established as described under Low-speed Flight Characteristics, paragraph 13. Only the collective control remained fixed during low-speed dynamic stability tests.

10. Spiral stability was evaluated by stabilizing and trimming the aircraft in level unaccelerated flight. With lateral and collective fixed, a 5 degree bank angle left and right was established using directional control only. Once a bank angle was established, the directional controls were returned to the trimmed position and fixed while the resultant aircraft response was observed.

11. Long-term stick-fixed longitudinal stability characteristics were evaluated by displacing the aircraft from trim airspeed approximately 10 knots. The technique consisted of reducing airspeed below the trim value using cyclic control, then returning the cyclic control to the original trim position and observing the resulting aircraft response.

Controllability

12. Controllability tests were accomplished by applying left and right directional step inputs of up to 1 inch. The step input was made by rapidly displacing the control from trim, against the observer's foot. The input was rigidly held until a steady rate was obtained or recovery was necessary. A build-up of increasing step displacement was conducted. Collective control was held fixed. Hover and low-speed tests were conducted in winds of 5 knots or less at skid height of 10 feet.

Low-speed Flight Characteristics

13. Testing was accomplished using the ground pace vehicle method in winds of 5 knots or less. Tests were flown in not less than 5 knot increments from hover to 30 KTAS. All tests were conducted by stabilizing at a skid height of approximately 10 feet. The pace vehicle then established the desired speed using a calibrated fifth wheel for a reference ground speed. The test aircraft was flown in formation with the pace vehicle utilizing ground reference and horizontal situation indicator for heading stabilization. Data were recorded when the relative motion between the aircraft and pace vehicle was zero and the radar altimeter indicated no vertical displacement from the desired skid height.

14. Low-speed flight characteristics effects on yaw rates were accomplished by stabilizing on the 270 and 090 degree relative azimuths as described in paragraph 27. A left or right yaw up to 20 degrees/second was established; then, both collective and pedal controls were fixed while in the 120 to 240 degree relative azimuth region. Cyclic was used as necessary to maintain pace speed. Recovery from the yaw rate was initiated at the region boundary. Recovery was completed prior to passing the 360 degree relative azimuth.

Trim Changes With Power Effects

15. These tests were conducted by stabilizing the aircraft in a maximum power climb at the desired trim airspeed and sideslip with the SAS OFF. Collective control was gradually reduced while airspeed and sideslip were maintained until the rate of descent reached 1000 feet per minute.

Mission Maneuvers

16. Mission maneuvers were conducted in accordance with the OH-58 helicopter ATM (ref 11, app A).

APPENDIX E. TEST DATA

Figure	Figure Number
Control System Characteristics	E-1 through E-3
Static Lateral-Directional Stability	E-4 through E-9
Maneuvering Stability	E-10
Dynamic Stability	E-11 through E-151
Controllability	E-152 through E-157
Low-Speed Flight	E-158 through E-208
Trim Changes with Power Effects	E-209 through E-216
Mission Maneuvers	E-217 through E-254
Pitot-Static Calibration	E-255

FIGURE E-1
LIMITS OF CYCLIC CONTROL TRAVEL
JOH-58C USA S/N 70-15349

NOTES:
1. ROTORS STATIC
2. CONTROL POSITION MEASURED AT CENTER OF GRIP
3. HYDRAULIC AND ELECTRICAL POWER PROVIDED BY EXTERNAL POWER SOURCES
4. COLLECTIVE CONTROL FULL DOWN

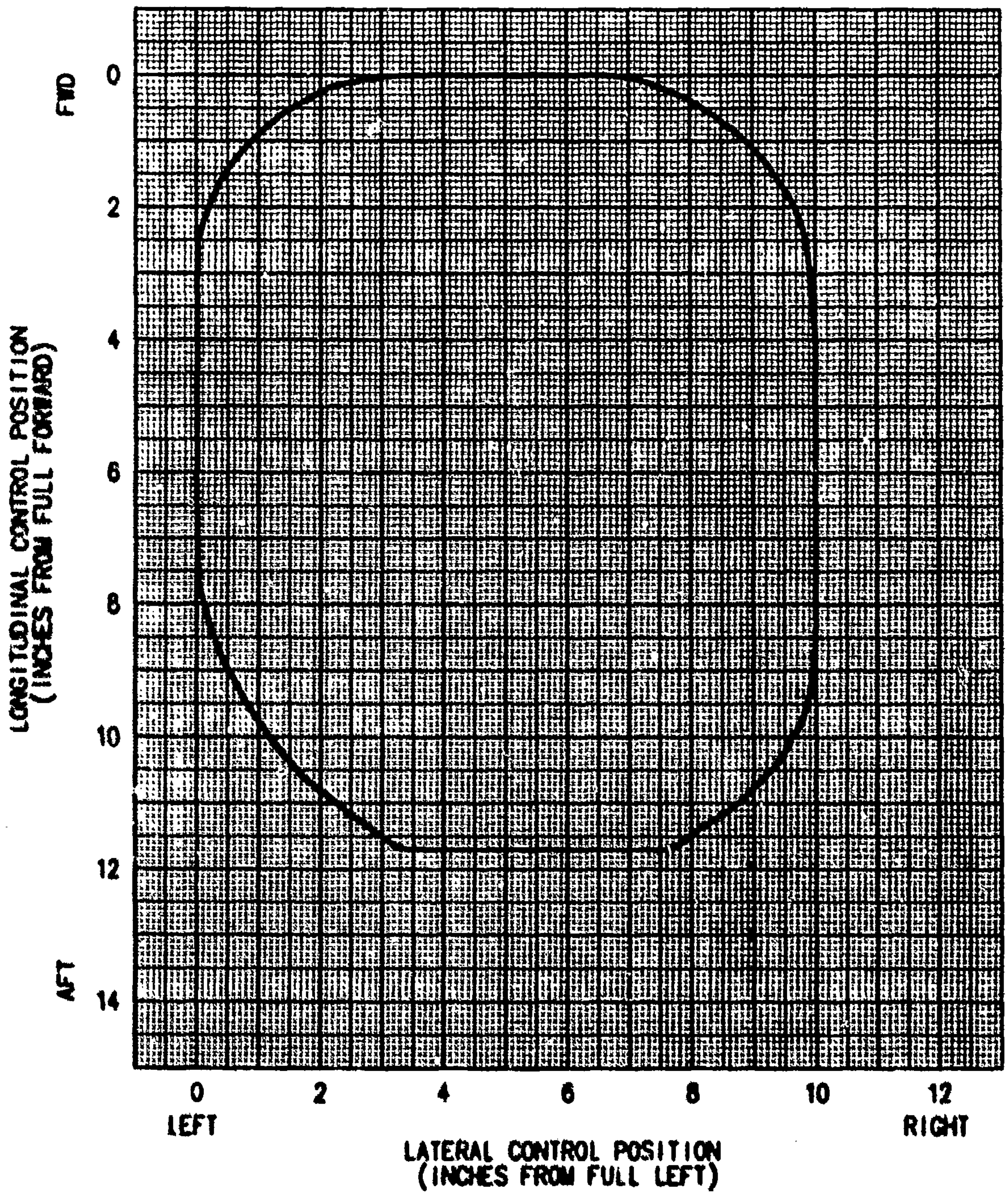


FIGURE E-2
LONGITUDINAL CONTROL SYSTEM CHARACTERISTICS
JOH-58C USA S/N 70-15349

NOTES:
1. ROTORS STATIC
2. FORCES AND POSITIONS MEASURED AT CENTER OF CONTROL GRIP
3. HYDRAULIC AND ELECTRICAL POWER PROVIDED BY EXTERNAL POWER SOURCES
4. HYDRAULIC SYSTEM ON
5. STABILITY AUGMENTATION SYSTEM ON
6. LATERAL CONTROL POSITION = 5.6 INCHES FROM FULL LEFT
7. FORCE TRIM ON, ADJUSTABLE CYCLIC FRICTION OFF
8. TOTAL LONGITUDINAL CONTROL TRAVEL = 11.7 INCHES

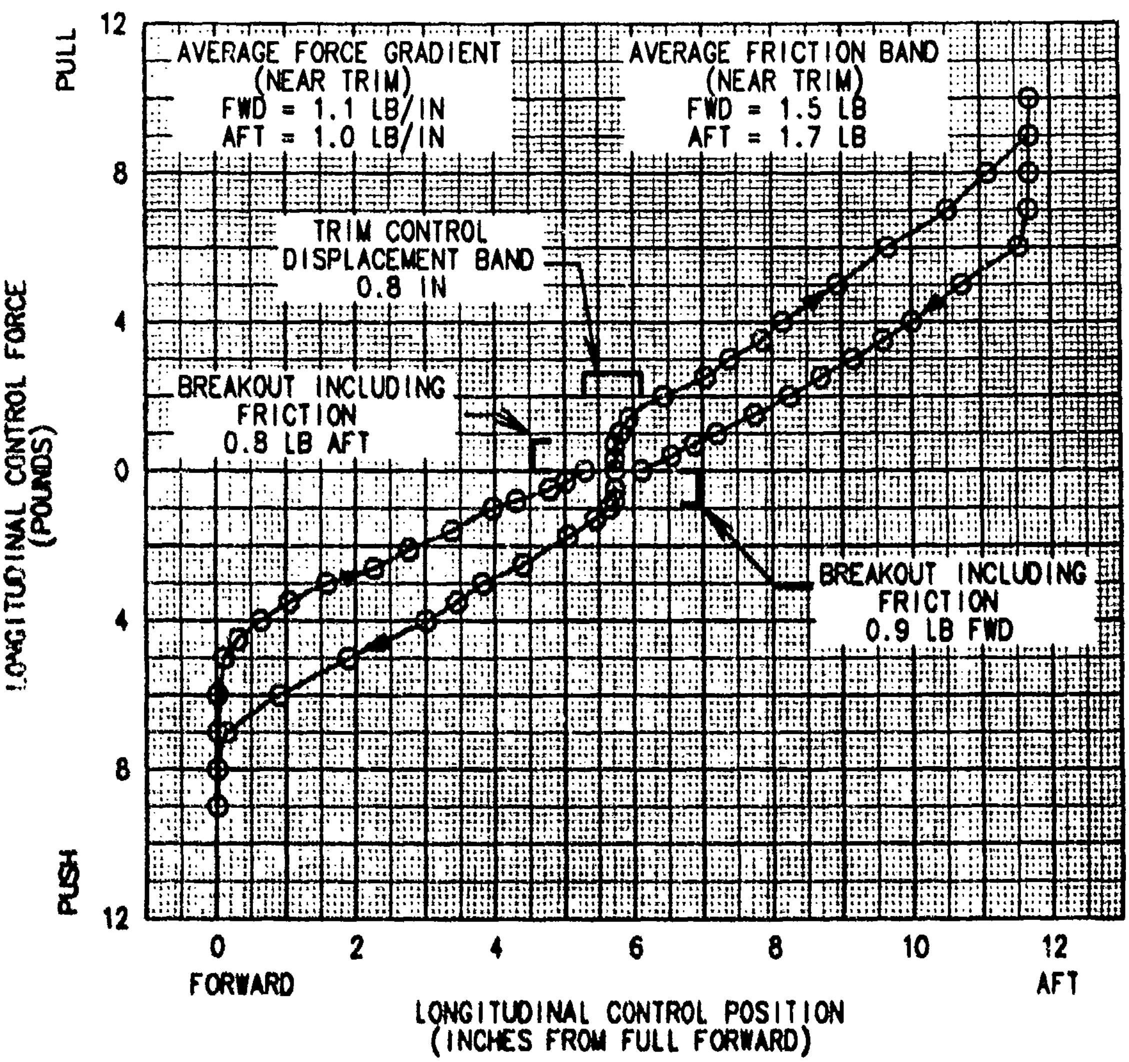


FIGURE E-3
LATERAL CONTROL SYSTEM CHARACTERISTICS
JOH-58C S/N 70-15349

NOTES:
1. ROTORS STATIC
2. FORCES AND POSITIONS MEASURED AT CENTER OF CONTROL GRIP
3. HYDRAULIC AND ELECTRICAL POWER PROVIDED BY EXTERNAL POWER SOURCES
4. HYDRAULIC SYSTEM ON
5. STABILITY AUGMENTATION SYSTEM ON
6. LONGITUDINAL CONTROL POSITION = 4.5 INCHES FROM FULL FORWARD
7. FORCE TRIM ON, ADJUSTABLE CYCLIC FRICTION OFF
8. TOTAL LATERAL CONTROL TRAVEL = 10.0 INCHES

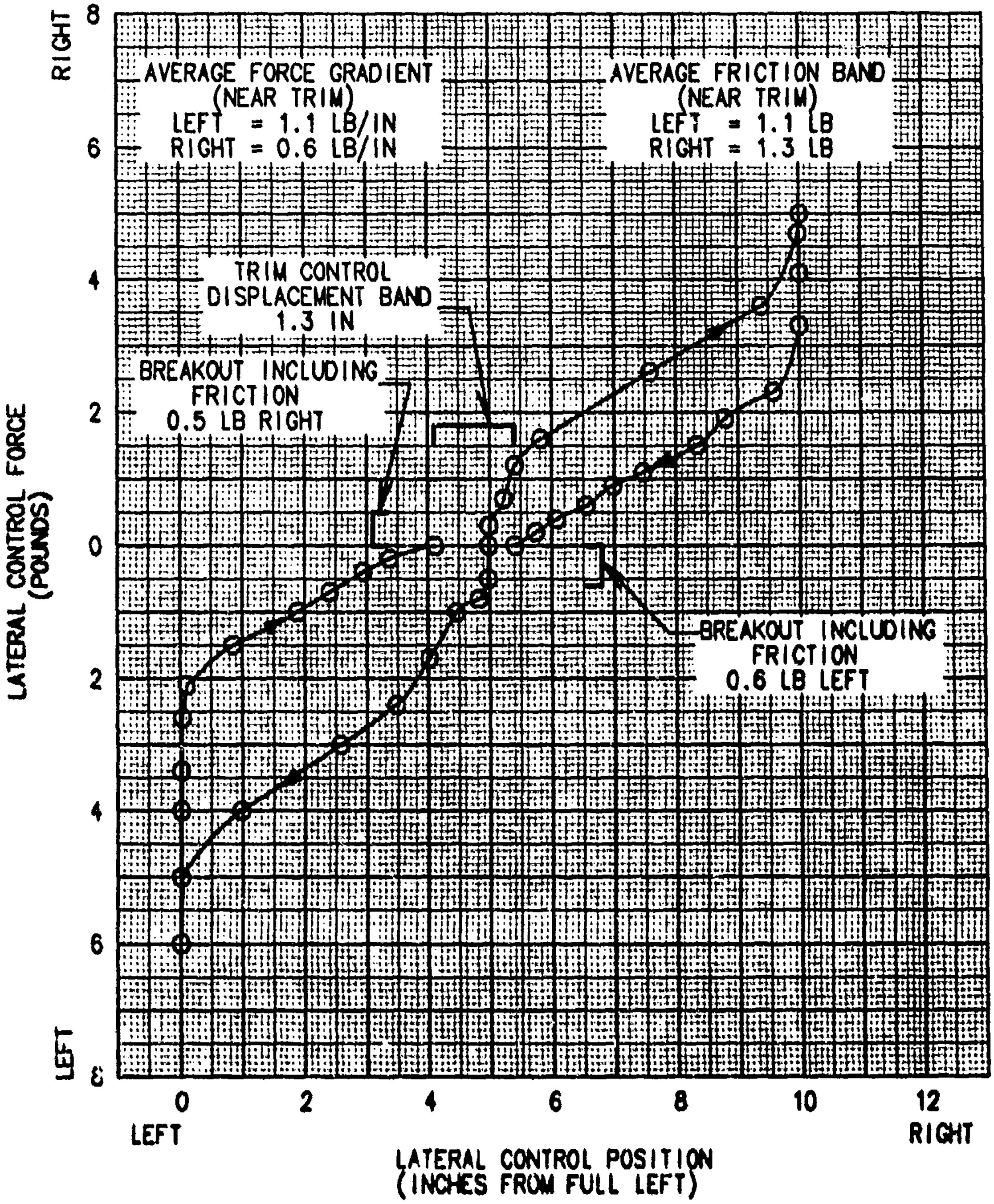


FIGURE E-4

STATIC LATERAL-DIRECTIONAL STABILITY

JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KNOTS)
2910	107.9	0.1 LT	6160	19.0	355	97

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. LEVEL FLIGHT
3. SHADED SYMBOL DENOTES TRIM

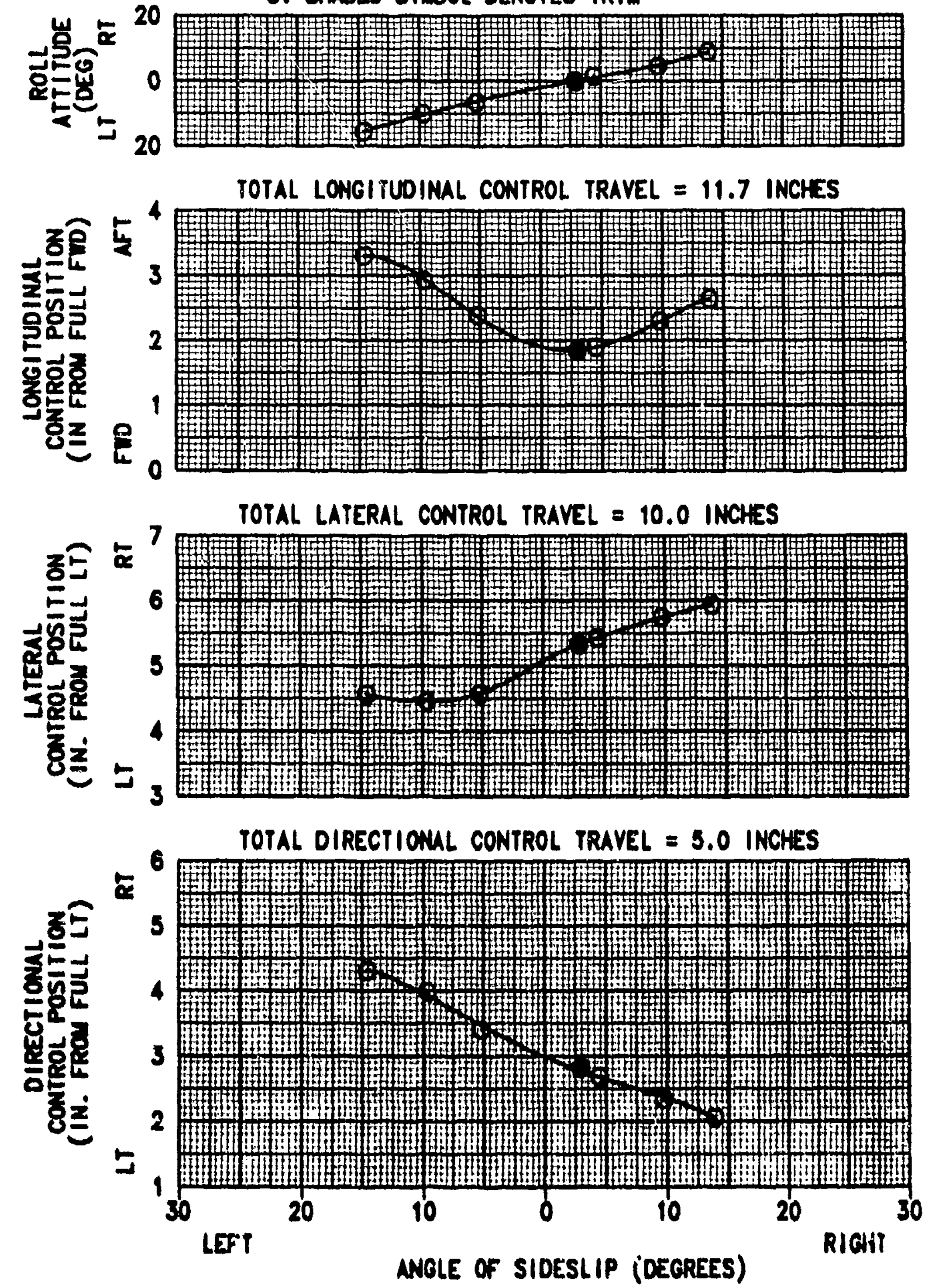


FIGURE E-5
STATIC LATERAL-DIRECTIONAL STABILITY
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KNOTS)
2870	107.8	0.1 LT	6270	18.5	354	95

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. LEVEL FLIGHT
3. SHADED SYMBOL DENOTES TRIM

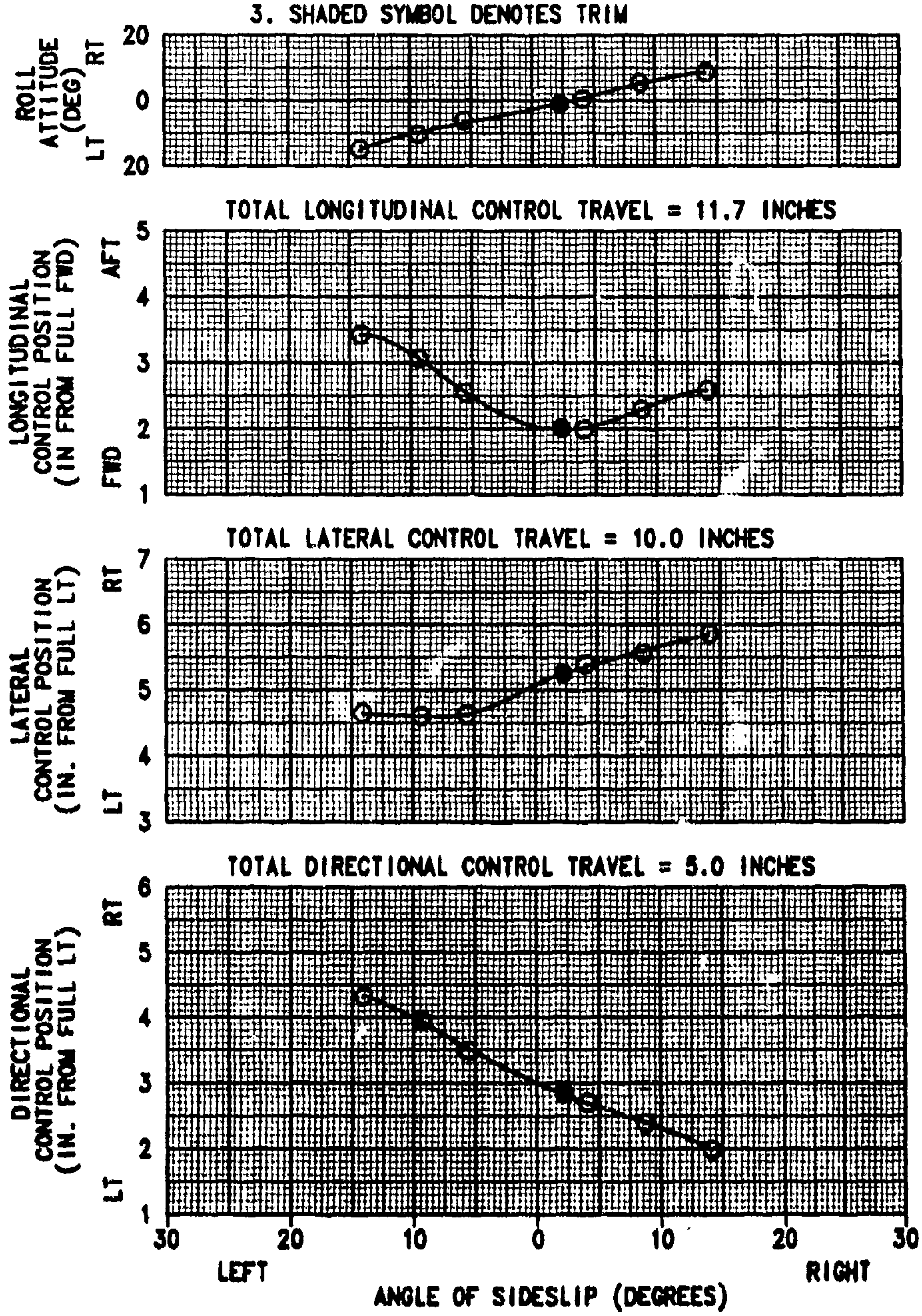


FIGURE E-6

STATIC LATERAL-DIRECTIONAL STABILITY

JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KNOTS)
2980	108.2	0.1 LT	6030	18.0	355	63

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. LEVEL FLIGHT
3. SHADED SYMBOL DENOTES TRIM

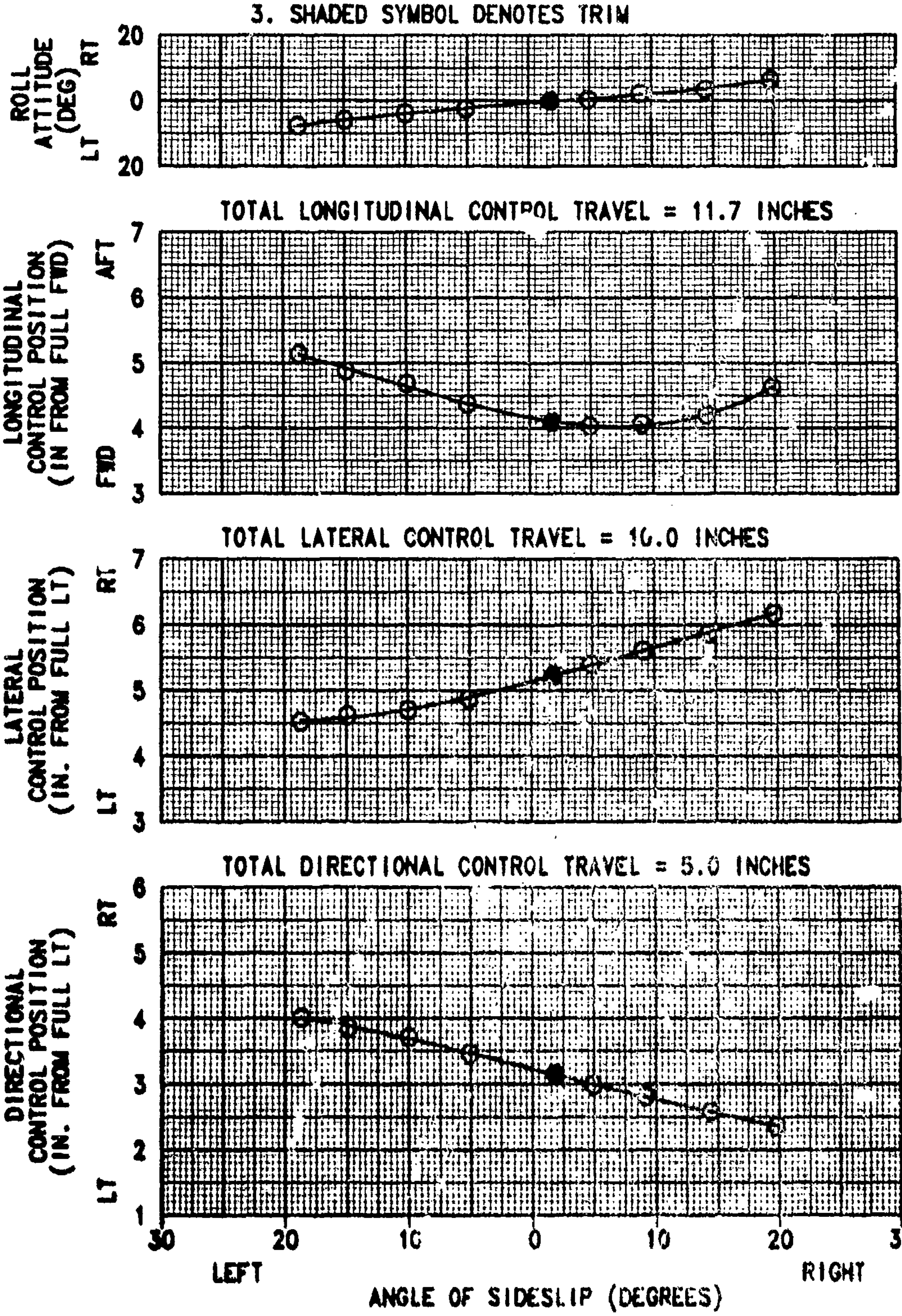


FIGURE E-7
STATIC LATERAL-DIRECTIONAL STABILITY
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KNOTS)
2960	108.1	0.1 LT	5970	18.0	354	63

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. LEVEL FLIGHT
3. SHADED SYMBOL DENOTES TRIM

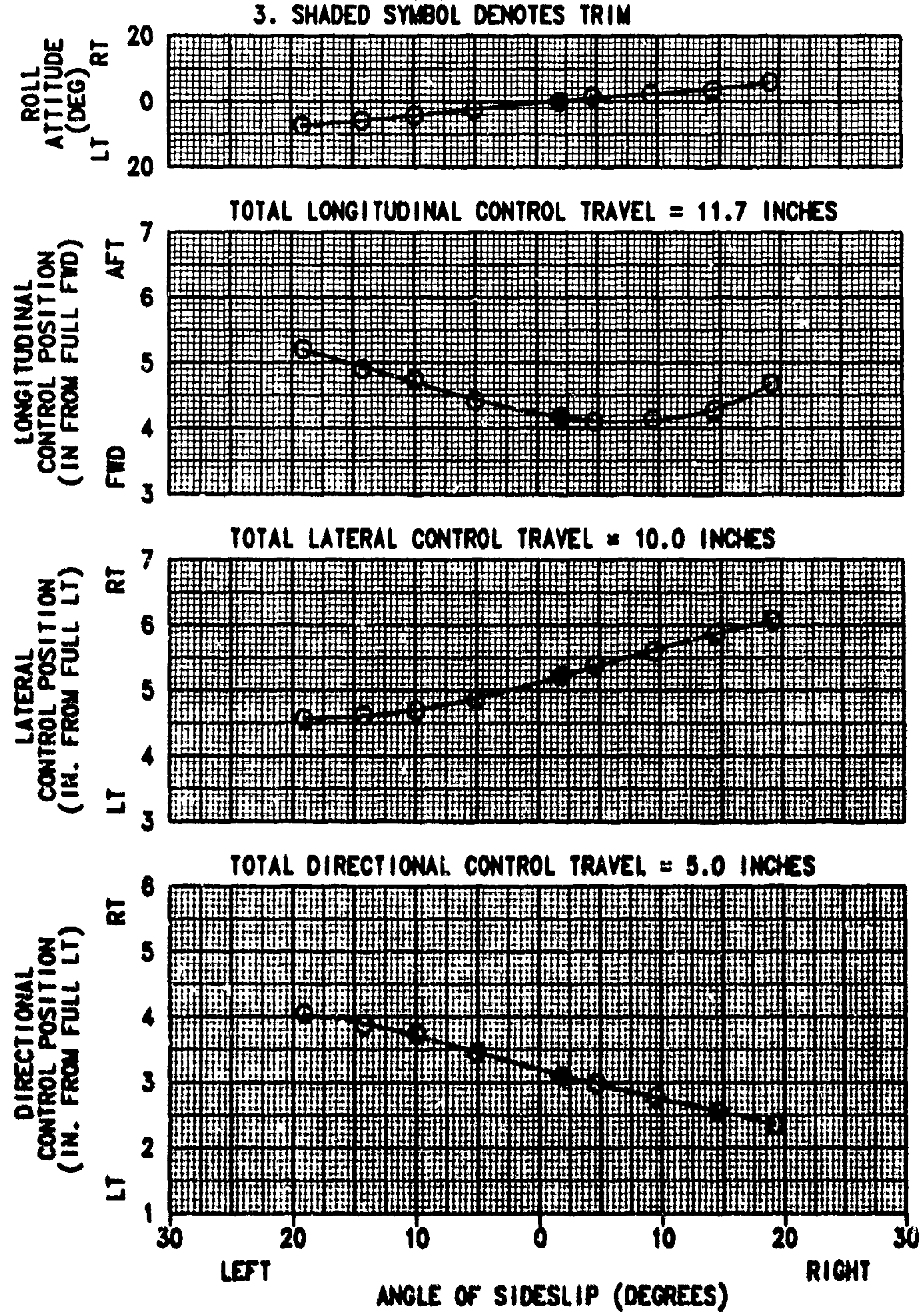


FIGURE E-8
STATIC LATERAL-DIRECTIONAL STABILITY IN CLIMBING FLIGHT
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KNOTS)
2820	107.7	0.1 LT	6330	19.0	354	64

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. MRP CLIMB
3. SHADED SYMBOL DENOTES TRIM

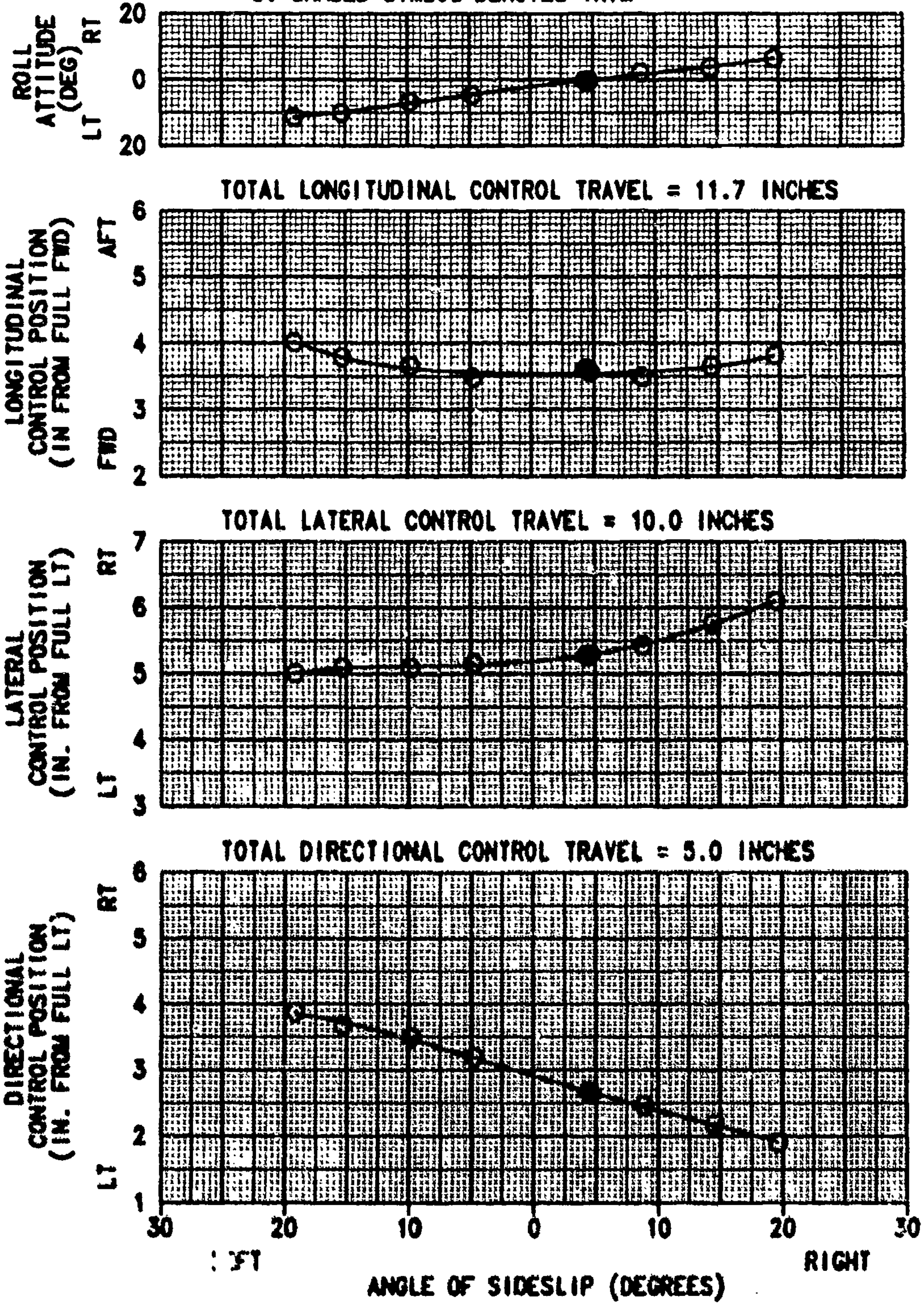


FIGURE E-9
STATIC LATERAL-DIRECTIONAL STABILITY IN AUTOROTATIONAL FLIGHT
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KNOTS)
2810	107.7	0.1 LT	5900	20.0	349	62

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. AUTOROTATION
3. SHADED SYMBOL DENOTES TRIM

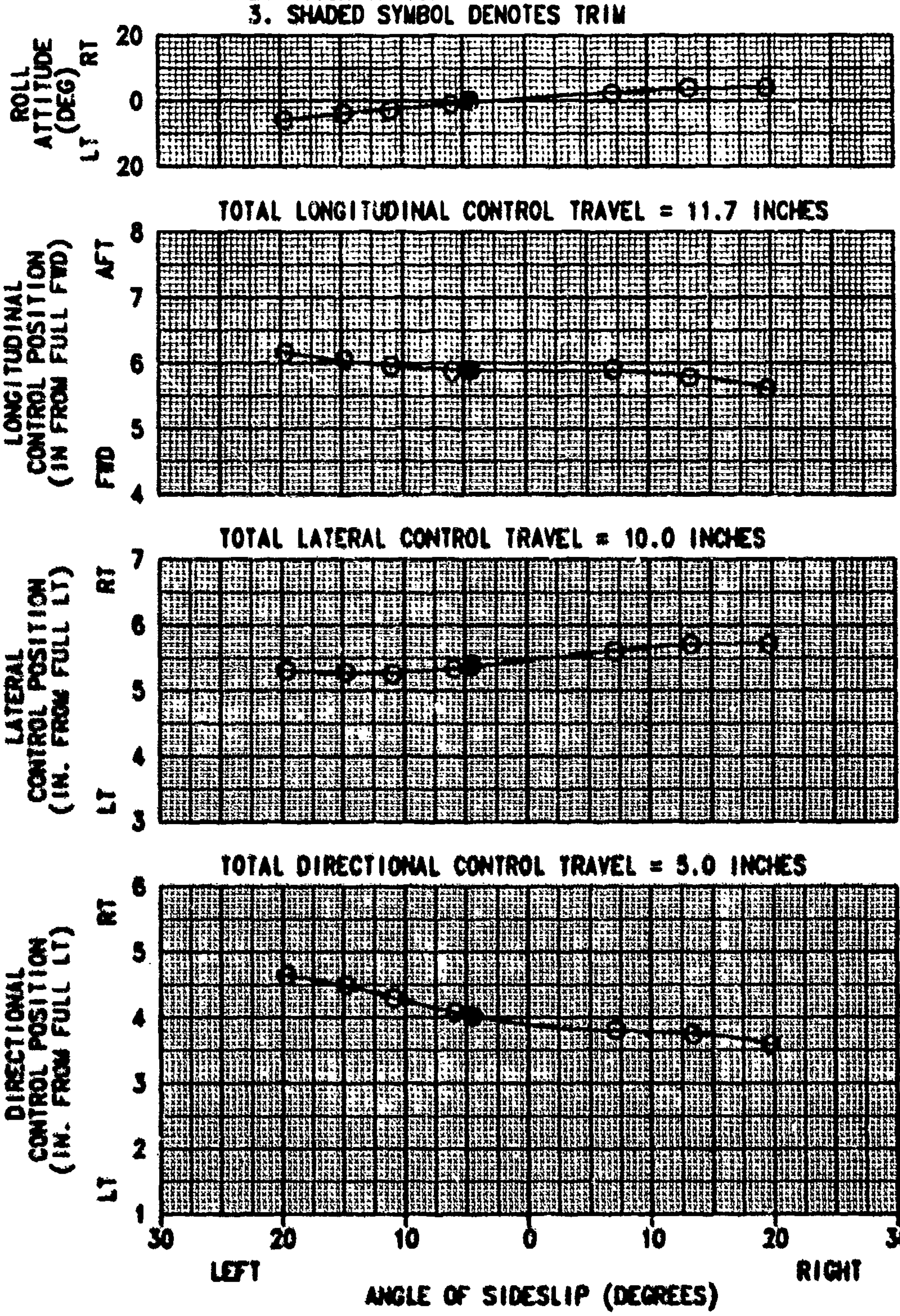


FIGURE E-10
MANEUVERING STABILITY
JOH-58C S/N 70-15349

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
○	2990	107.7	0.0	6690	21.0	355	64	ON
□	2930	107.5	0.0	6610	21.5	355	63	OFF

NOTE: 1. CLEAN CONFIGURATION, DOORS ON
2. SHADED SYMBOLS DENOTE TRIM,
OPEN SYMBOLS DENOTE LEFT TURN,
CROSSED SYMBOLS DENOTE RIGHT TURN

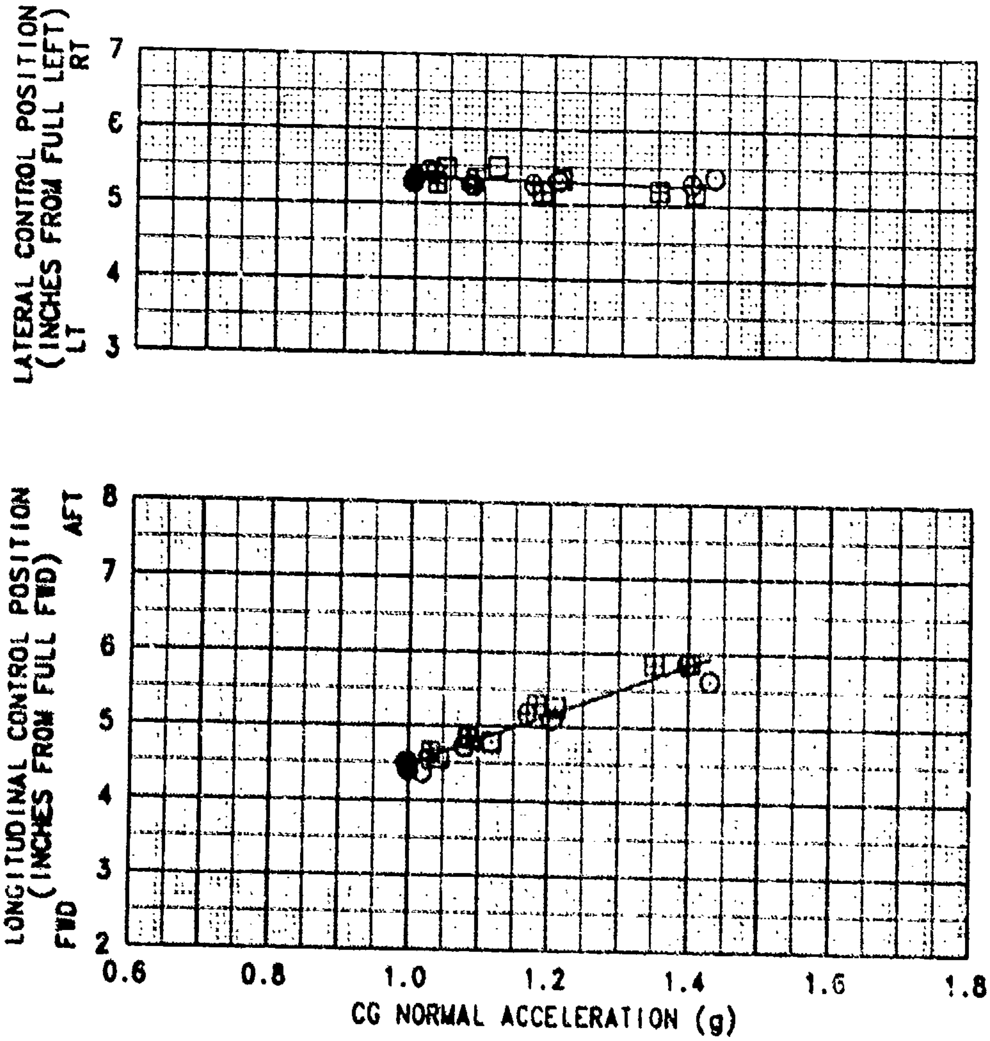


FIGURE E-11
LEFT DIRECTIONAL PULSE INPUT
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2820	107.9	0.1 LT	6000	19.0	354	99	ON

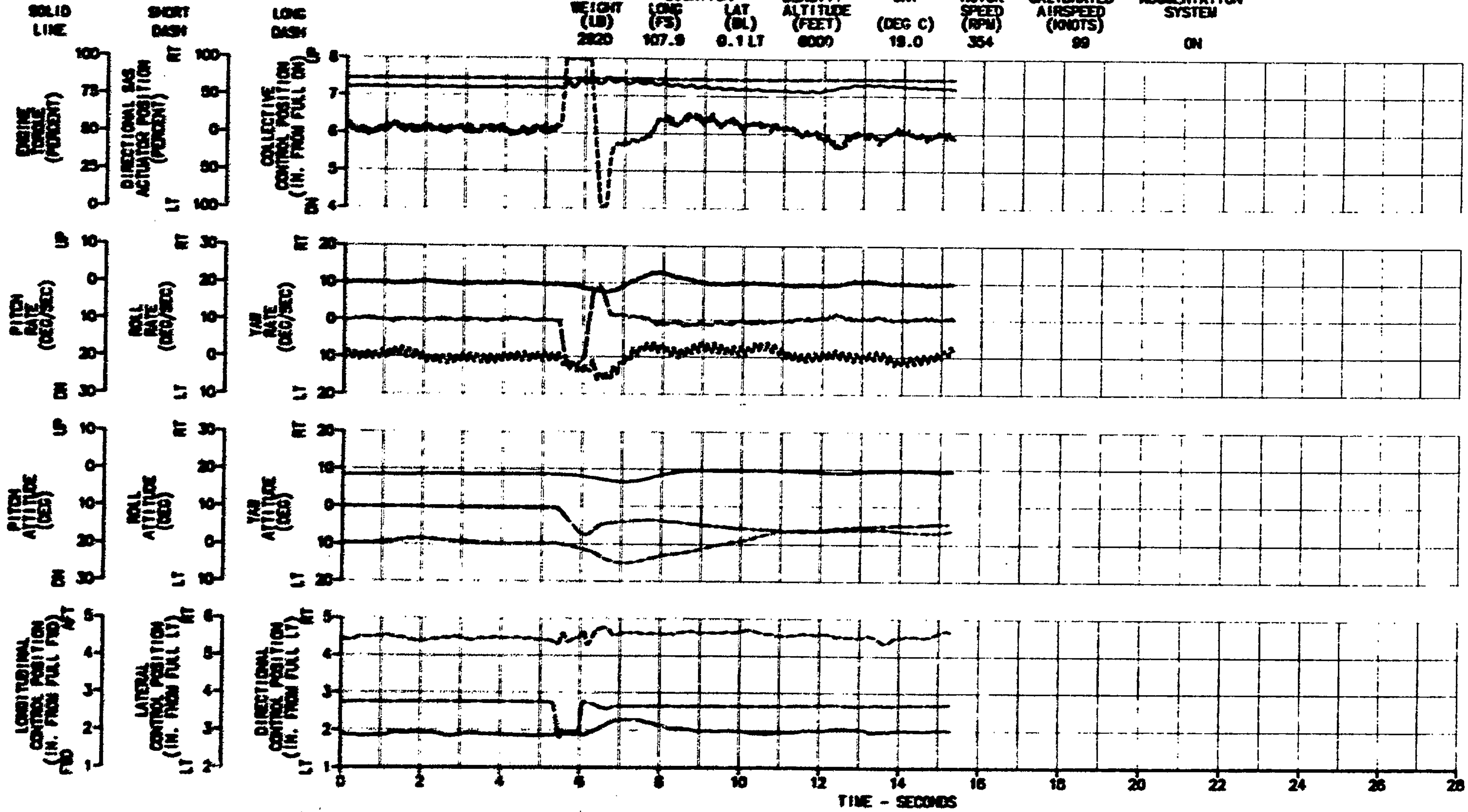


FIGURE E-12
LEFT DIRECTIONAL PULSE INPUT
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	107.9	0.1 LT	5580	19.0	354	104	OFF

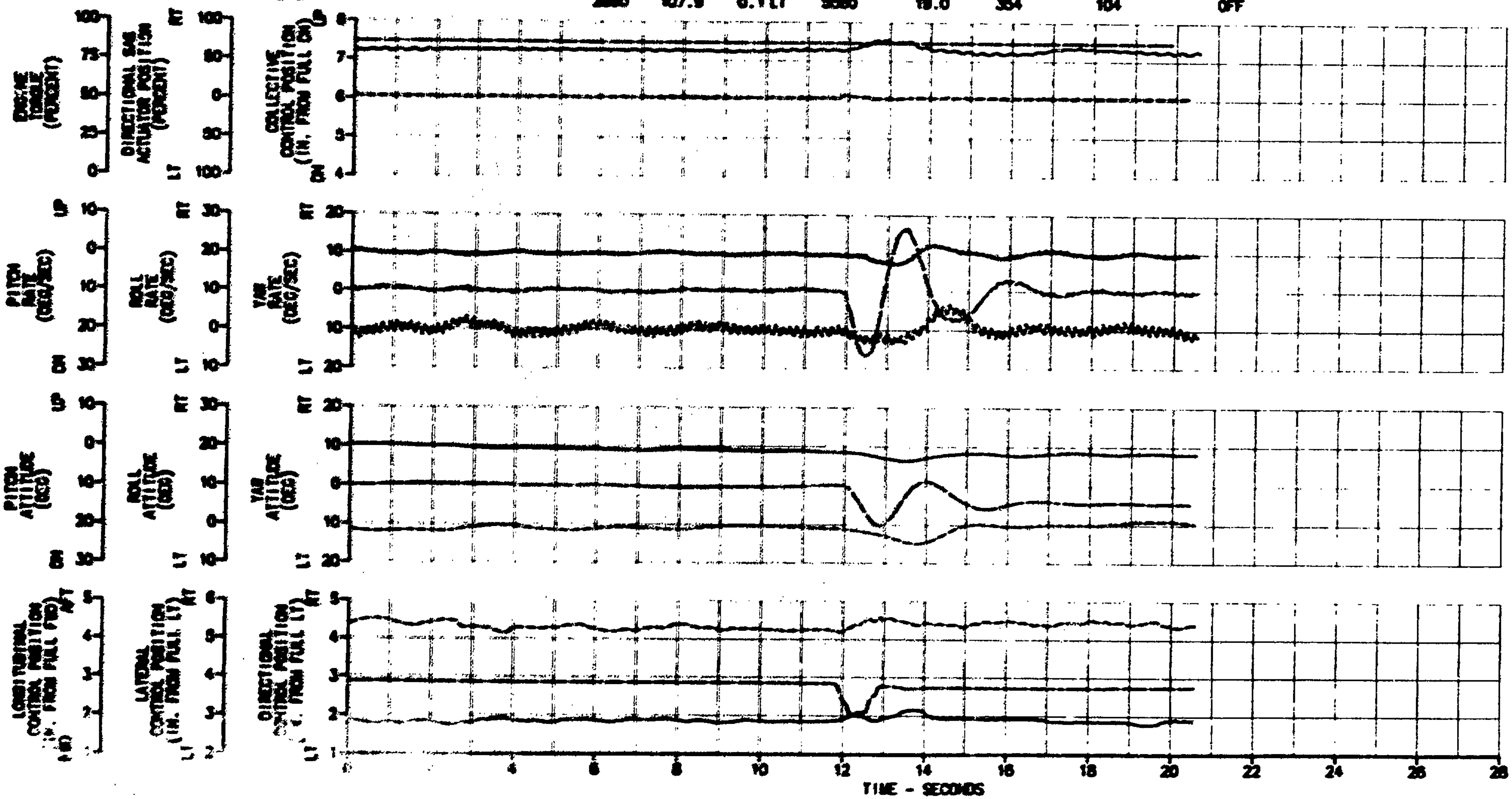


FIGURE E-13
RIGHT DIRECTIONAL PULSE INPUT
JOH-58C USA S/N 70-15349

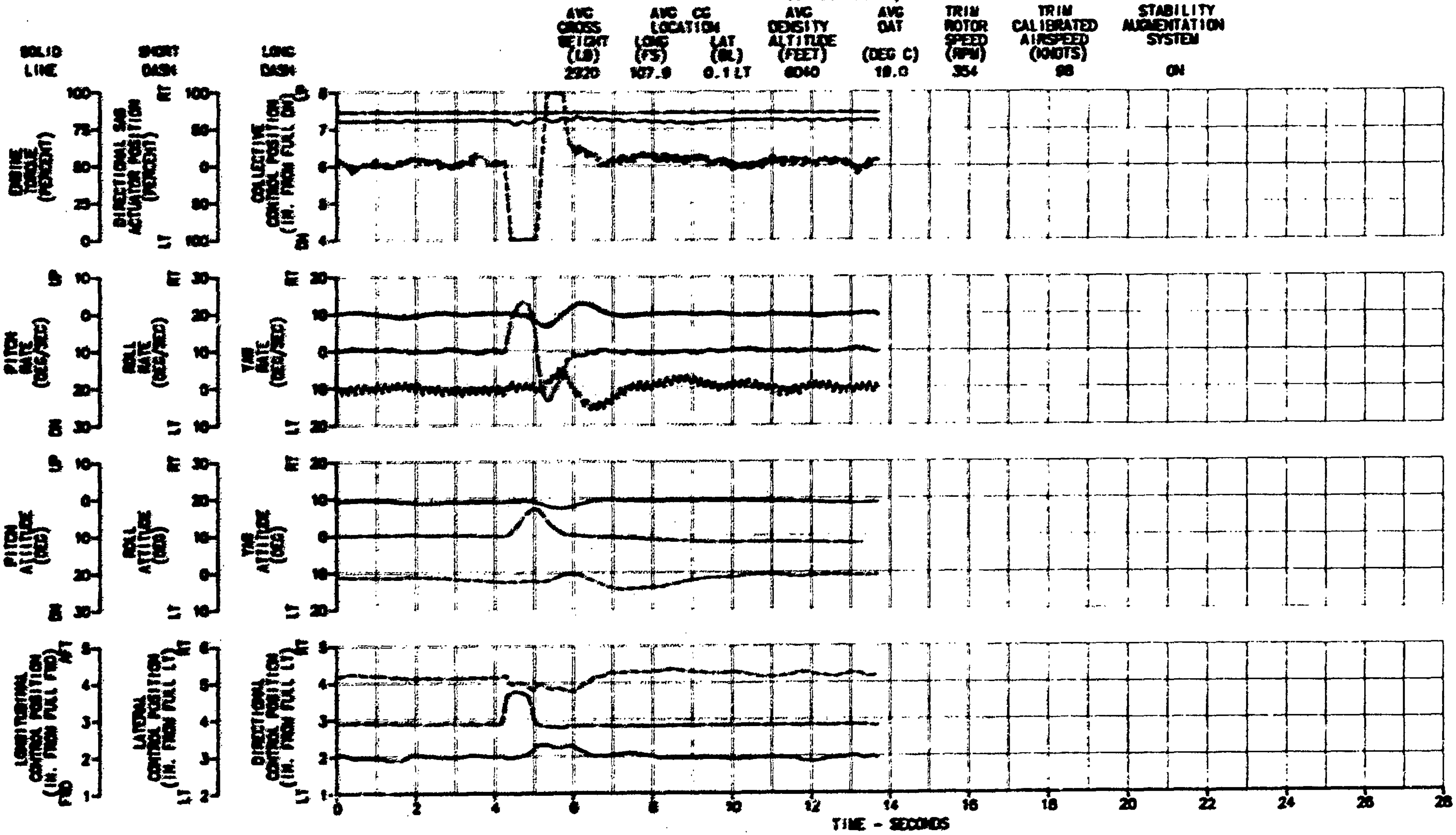


FIGURE E-14
RIGHT DIRECTIONAL PULSE INPUT
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	107.9	0.1 LT	5750	19.5	354	101	OFF

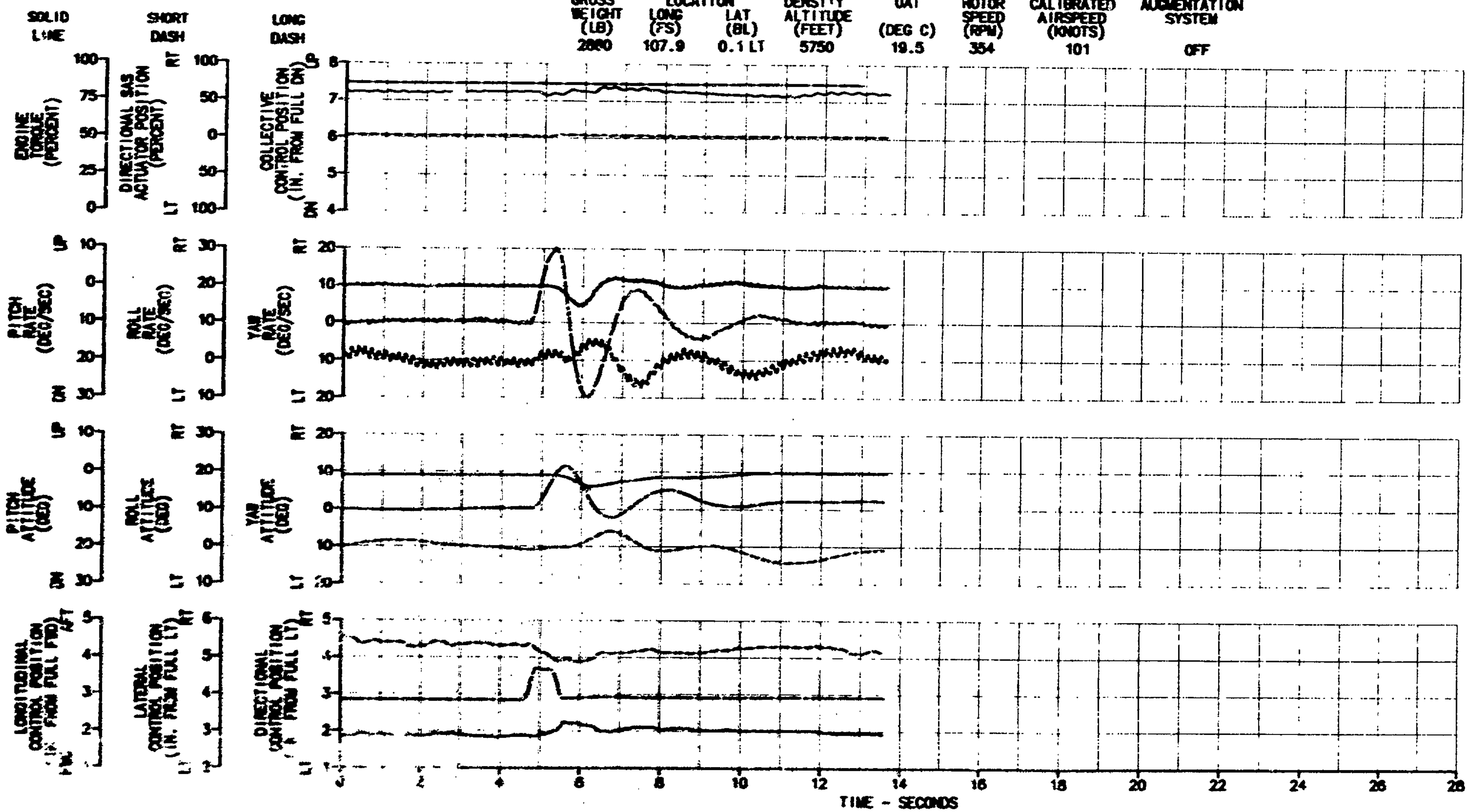


FIGURE E-15
LEFT DIRECTIONAL PULSE INPUT
JOH-58C USA S/N 70-15349

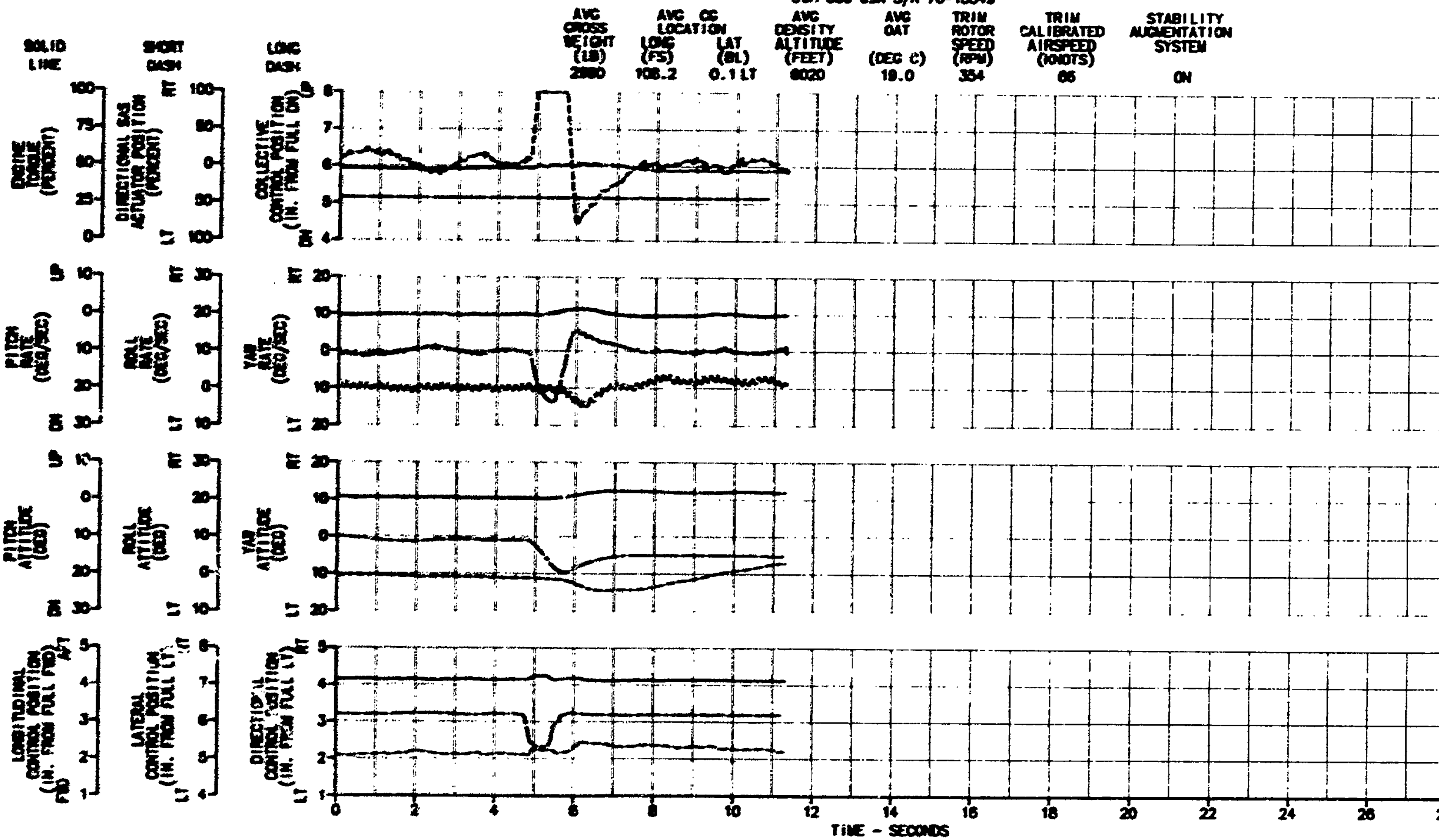


FIGURE E-16
LEFT DIRECTIONAL PULSE INPUT
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2950	108.1	0.1 LT	5740	18.5	354	66	OFF

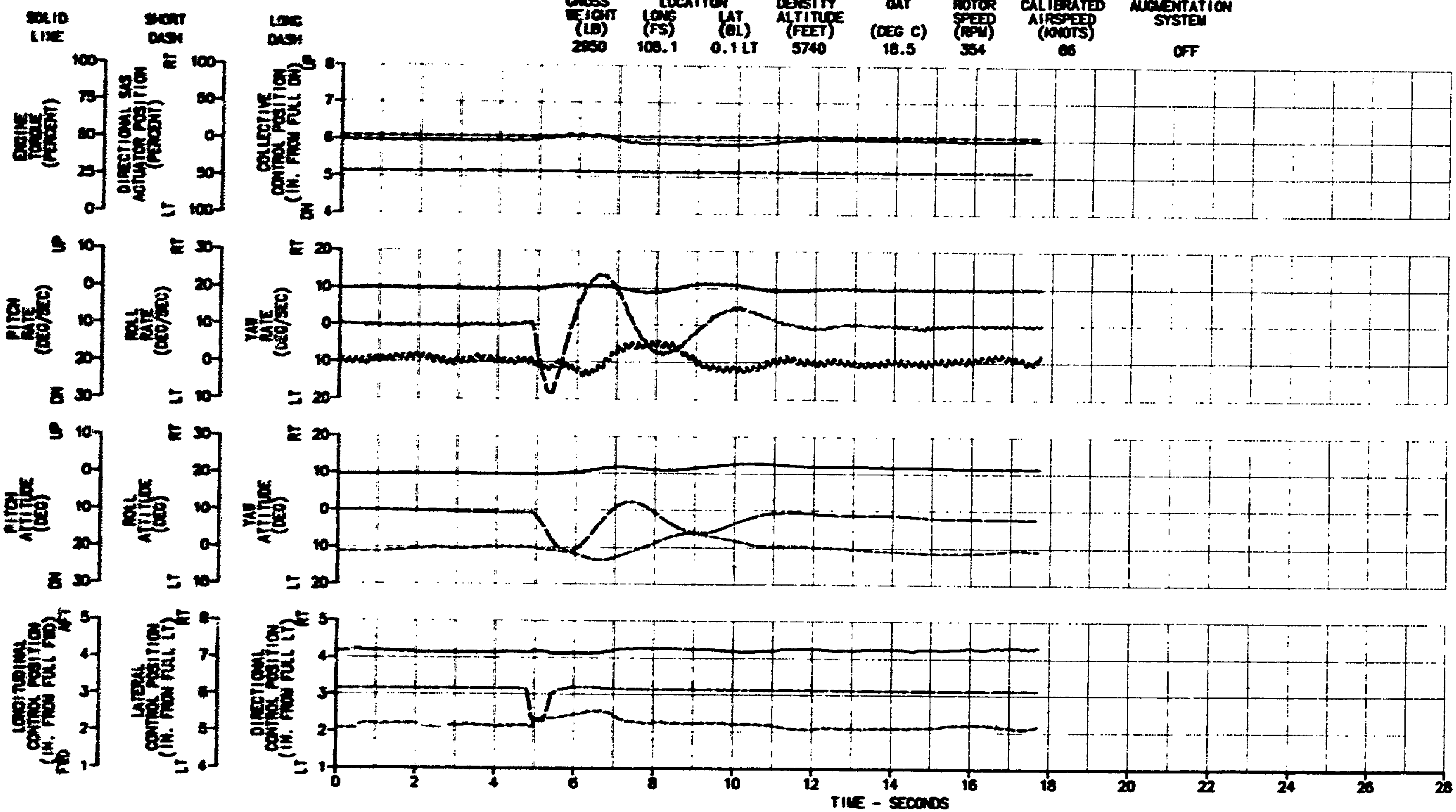


FIGURE E-17
RIGHT DIRECTIONAL PULSE INPUT
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2900	108.2	0.1 LT	6000	19.0	354	64	ON

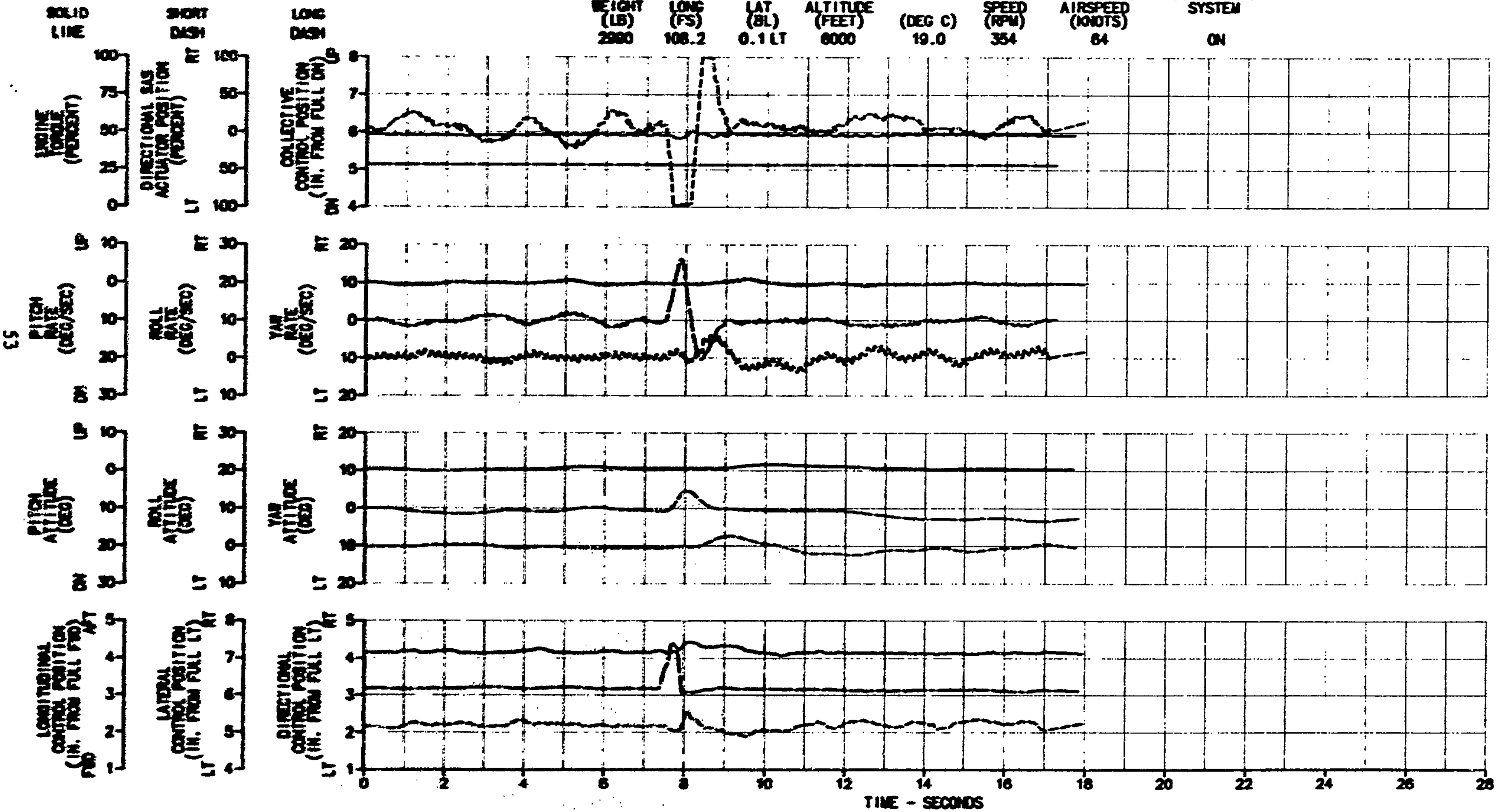


FIGURE E-18
RIGHT DIRECTIONAL PULSE INPUT
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2950	108.0	0.1 LT	5710	18.0	354	68	OFF

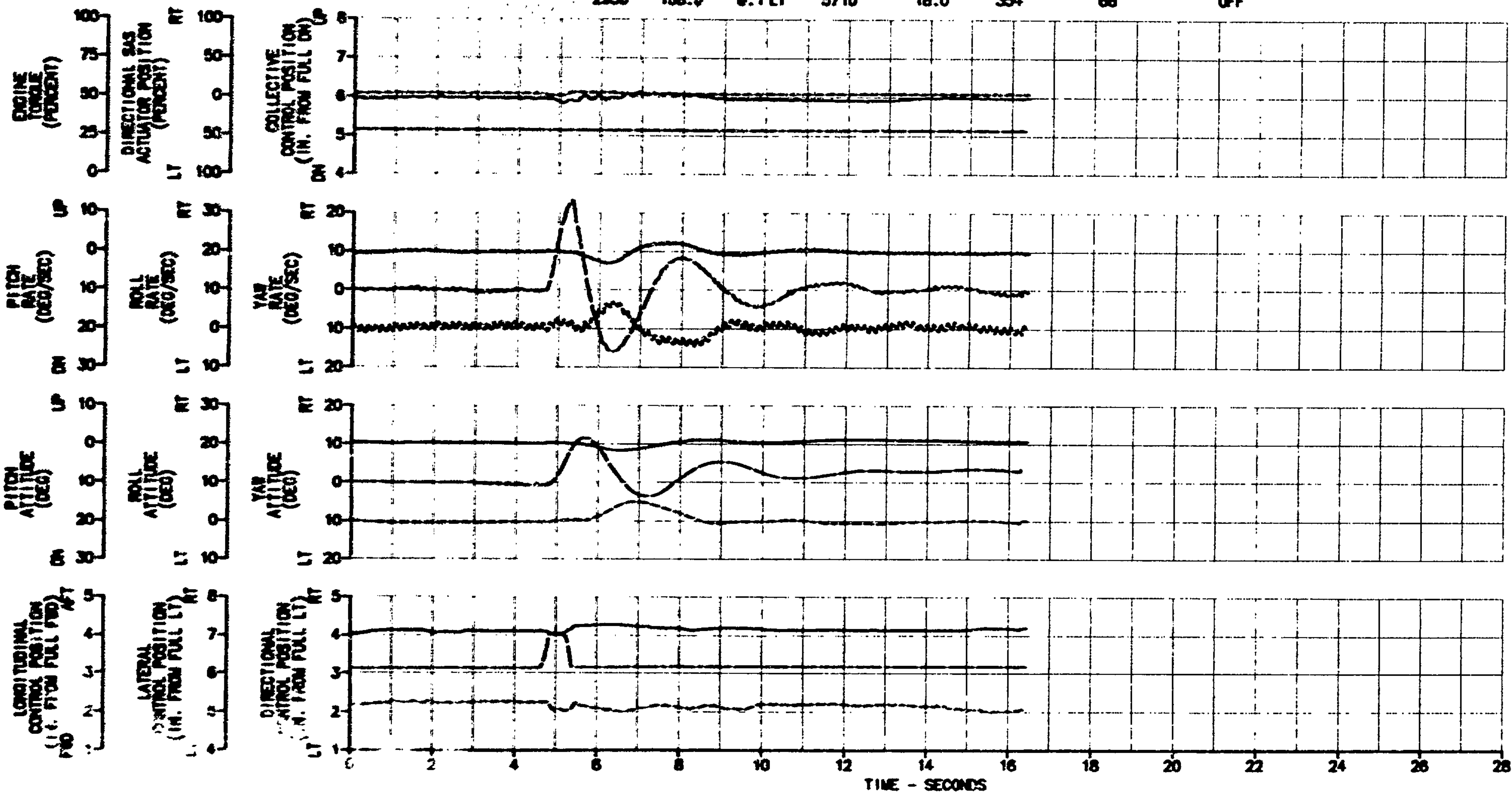


FIGURE E-19
LEFT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.2	0.1 LT	-3230	19.0	351	0	ON

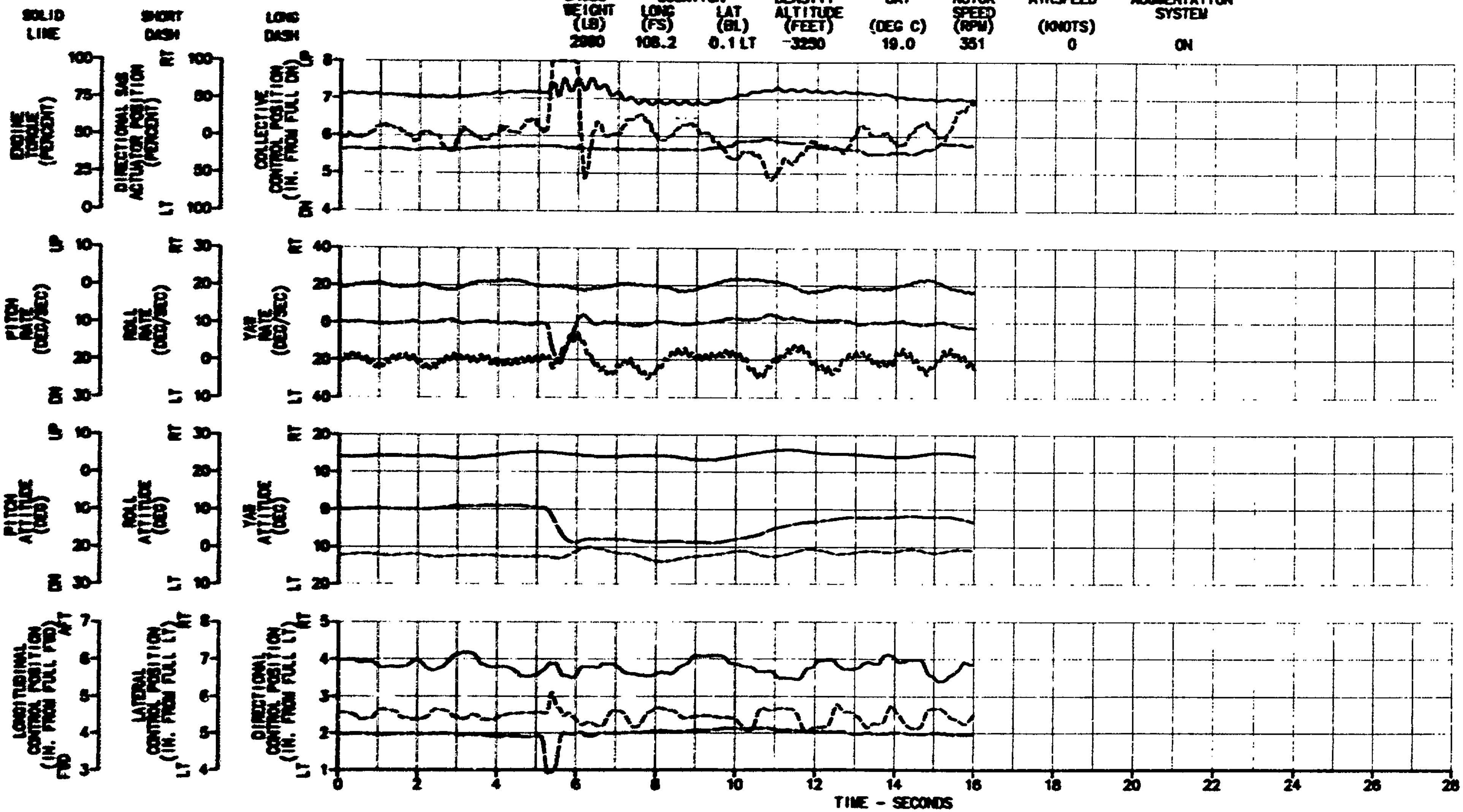


FIGURE E-20
LEFT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	108.1	0.1 LT	3240	19.0	351	0	OFF

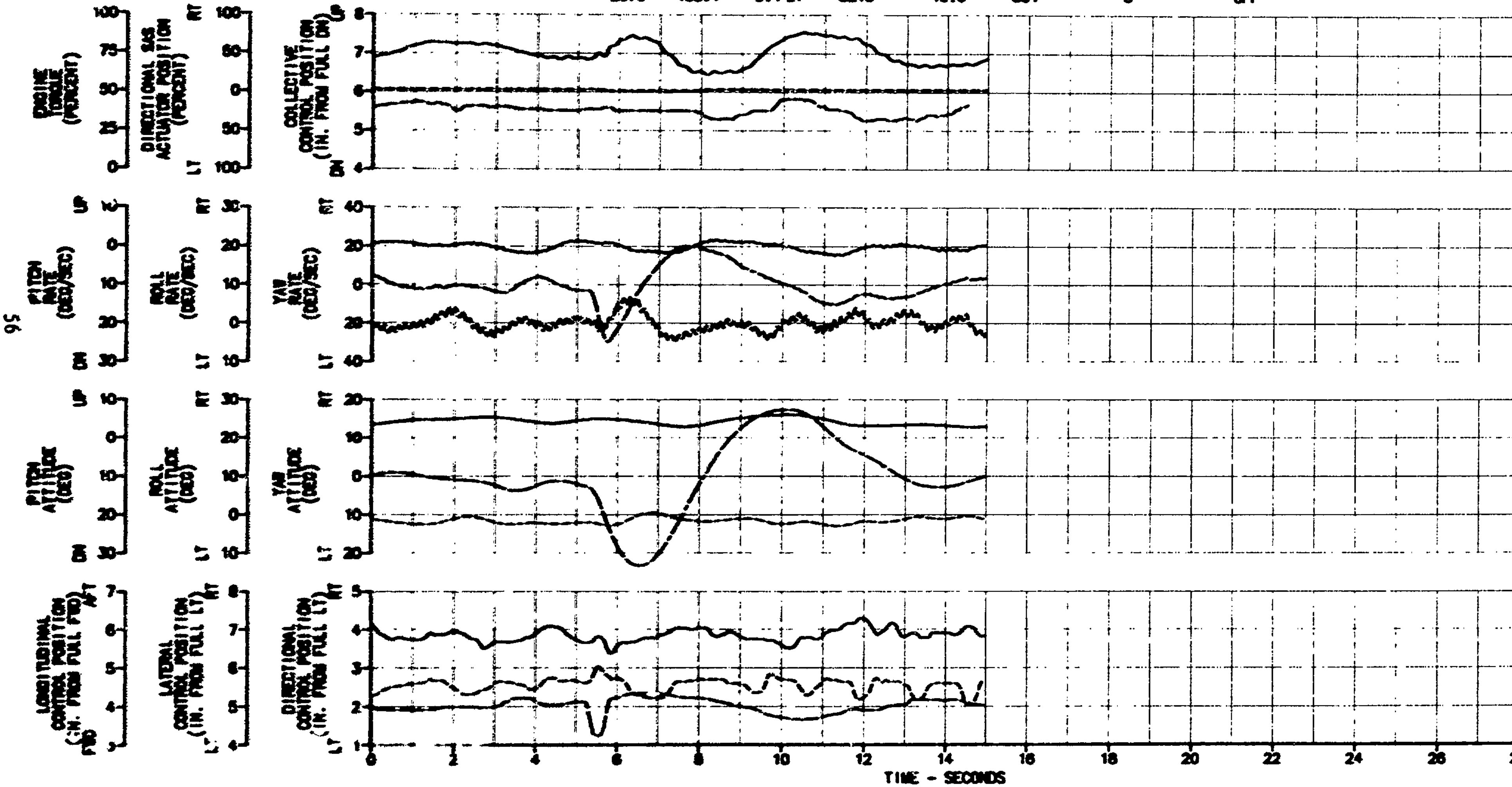


FIGURE E-21
RIGHT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	108.1	0.1 LT	3230	19.0	351	0	ON

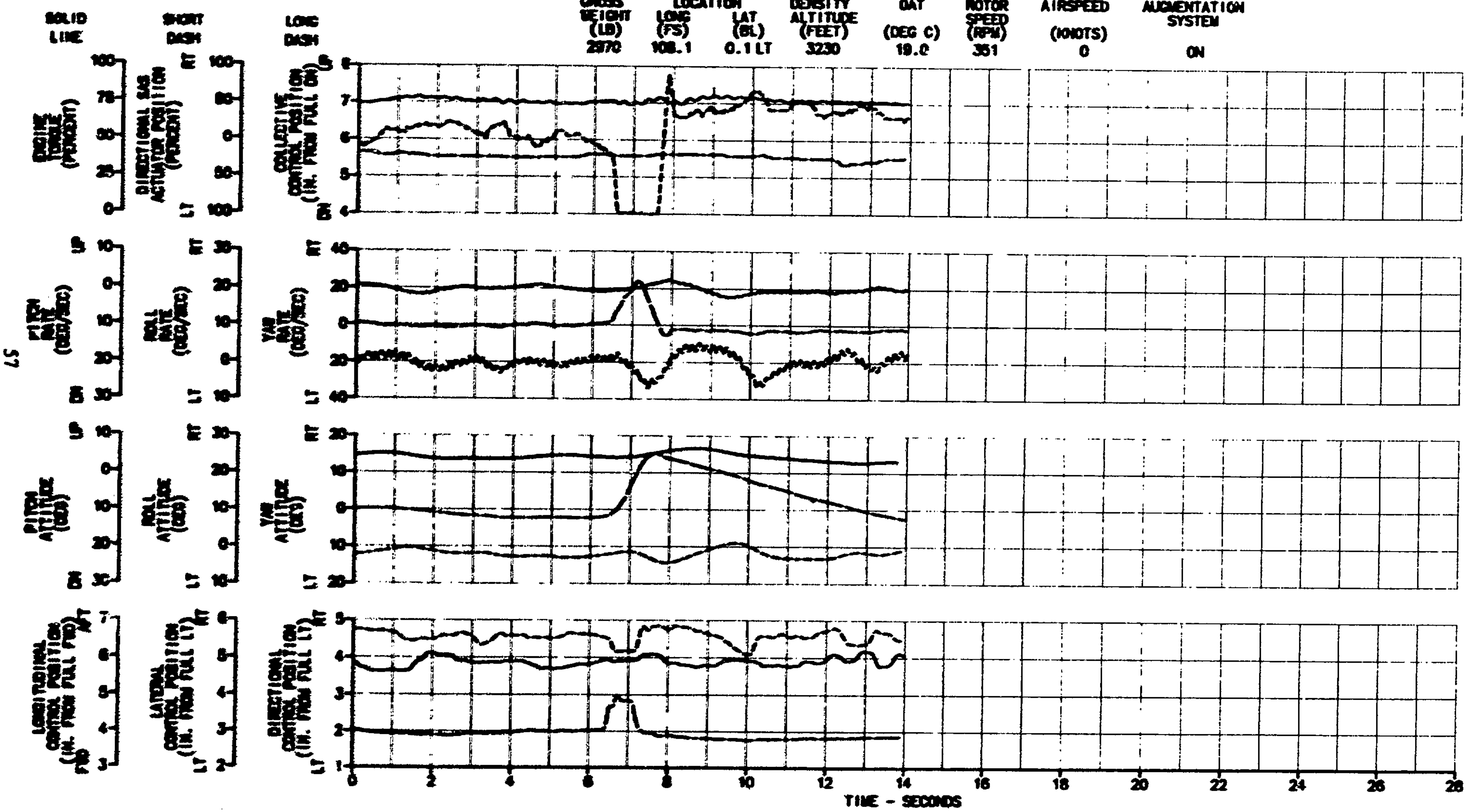


FIGURE E-22
RIGHT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
OH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	108.1	0.1 LT	3240	19.0	352	0	OFF

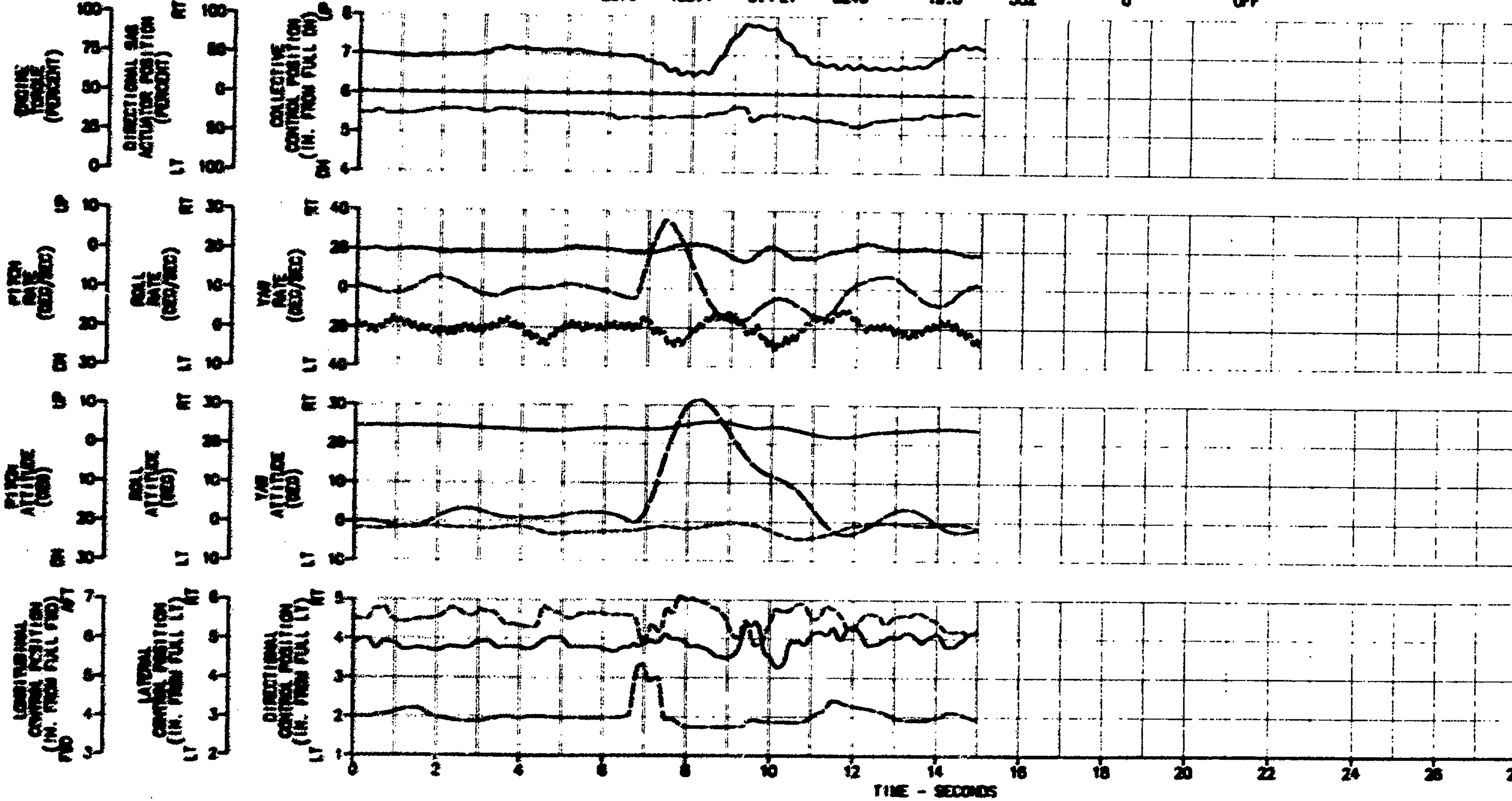


FIGURE E-23
LEFT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

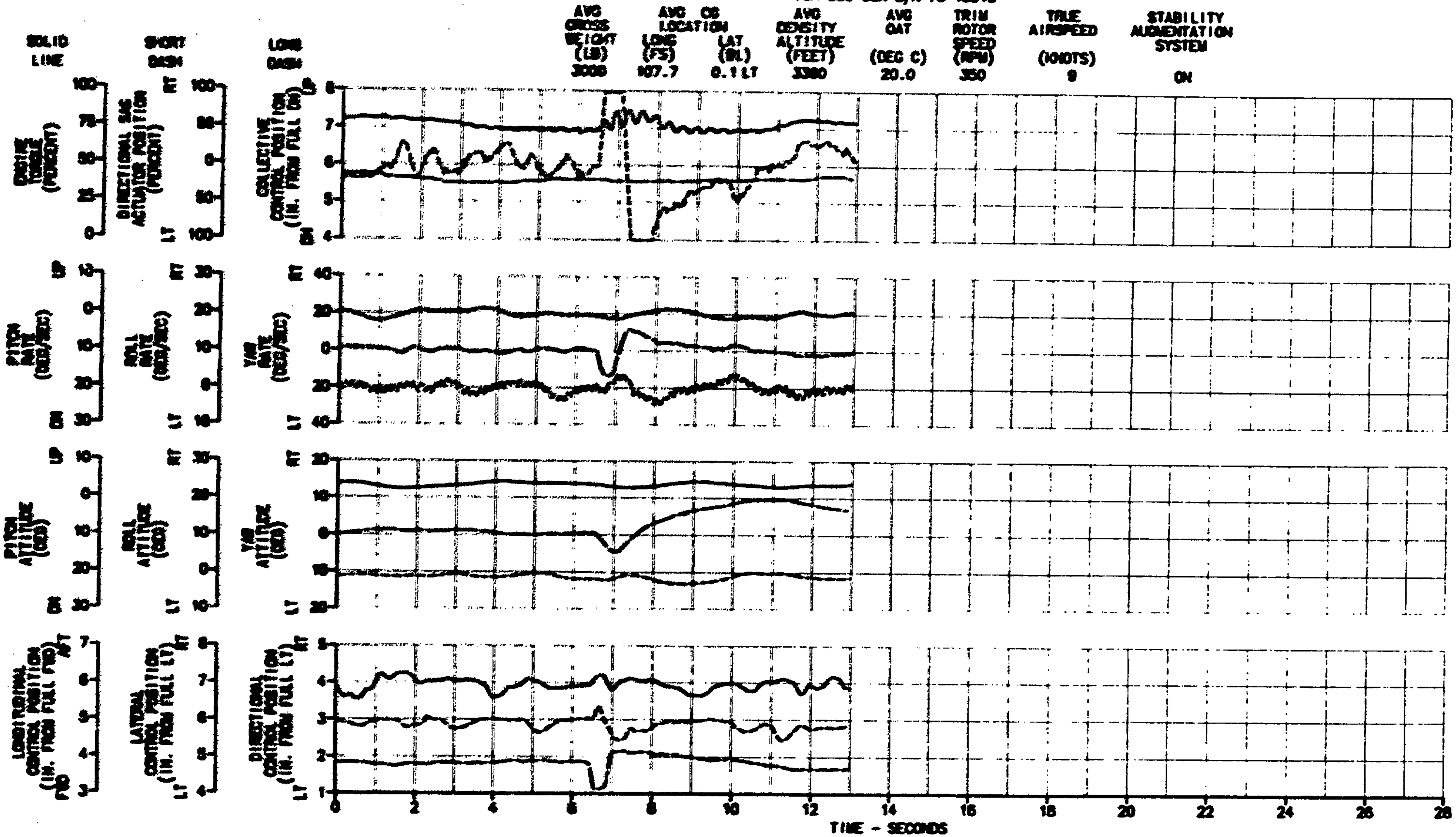


FIGURE E-24
LEFT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	107.6	0.1 LT	3360	20.0	351	9	OFF

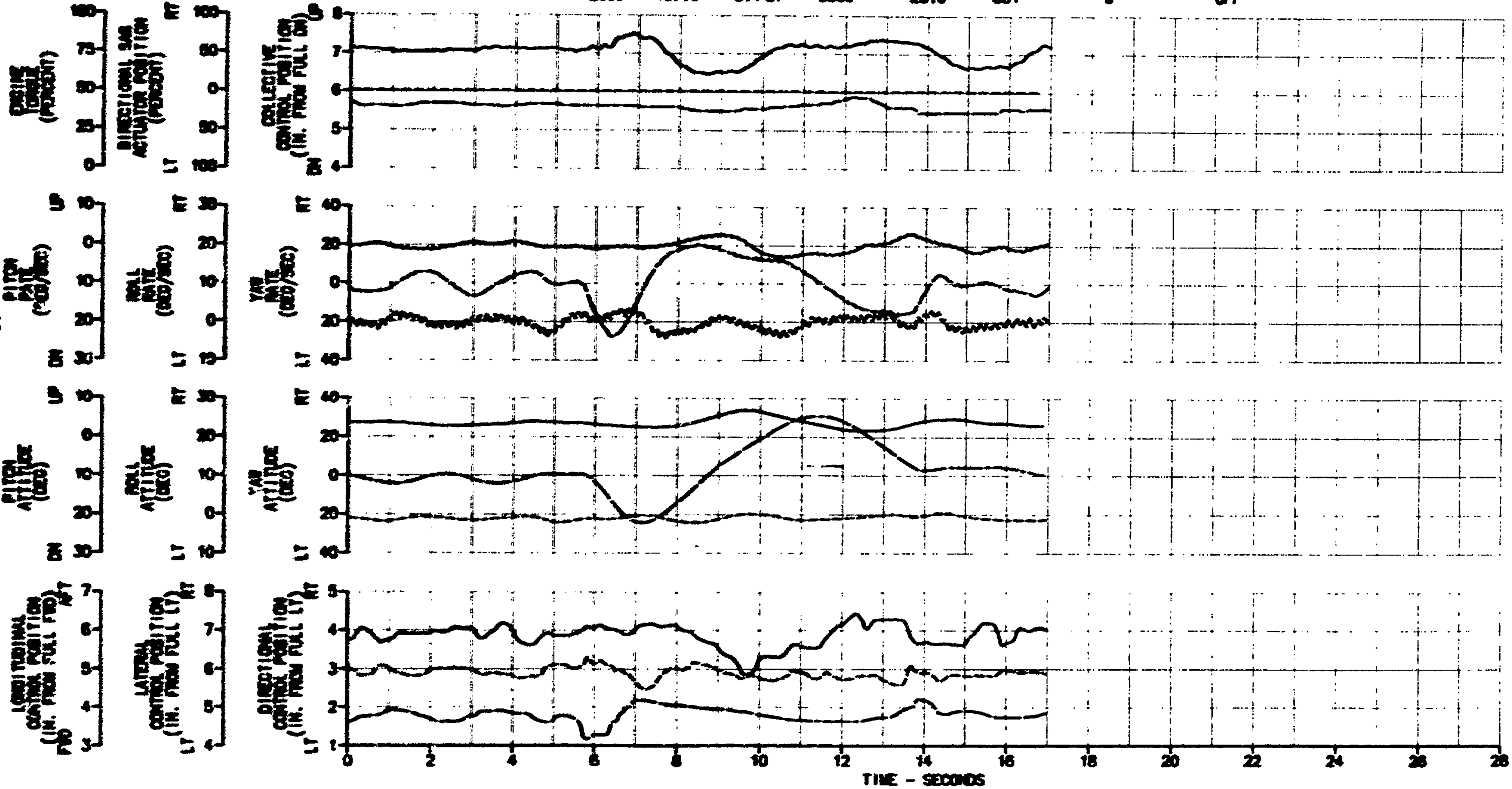


FIGURE E-25
RIGHT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
3000	107.7	0.1 LT	3370	20.0	353	9	ON

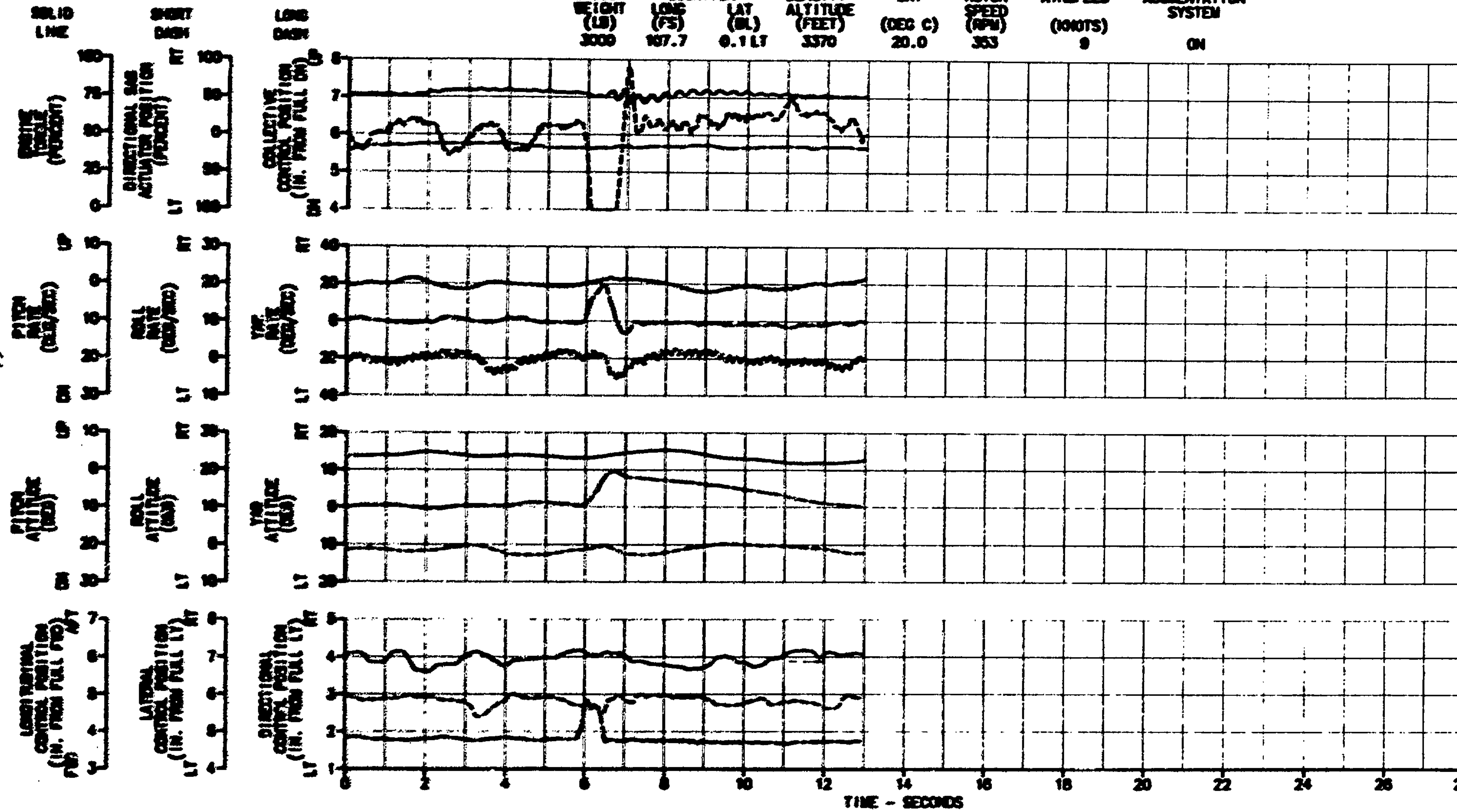


FIGURE E-28
RIGHT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

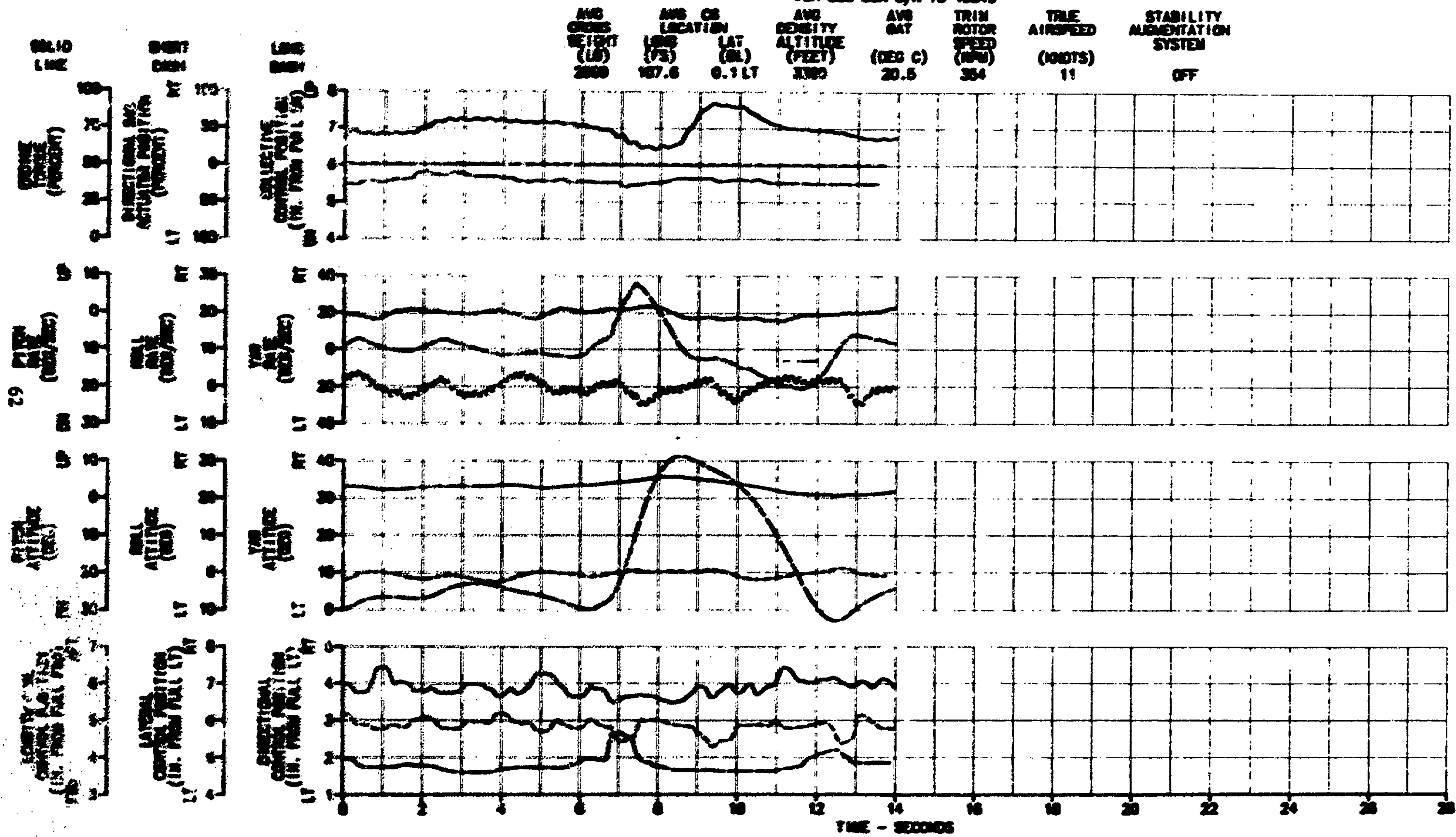


FIGURE E-27
LEFT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.7	0.1 LT	3480	20.5	355	20	ON

FIGURE E-28
LEFT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	108.7	0.1 LT	3380	19.5	354	20	OFF

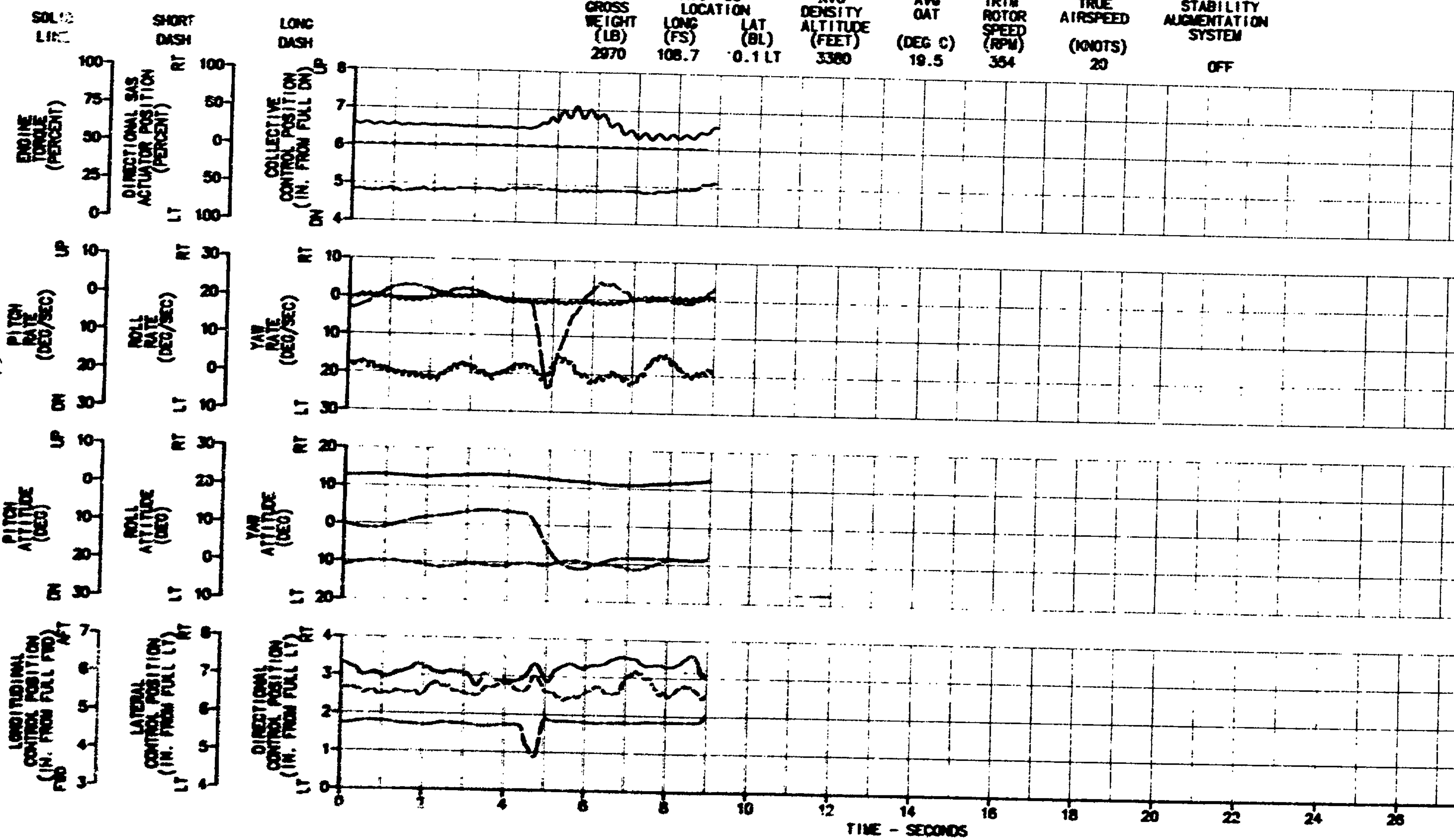


FIGURE E-29
RIGHT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2080	108.7	0.1 LT	3420	20.0	354	20	ON

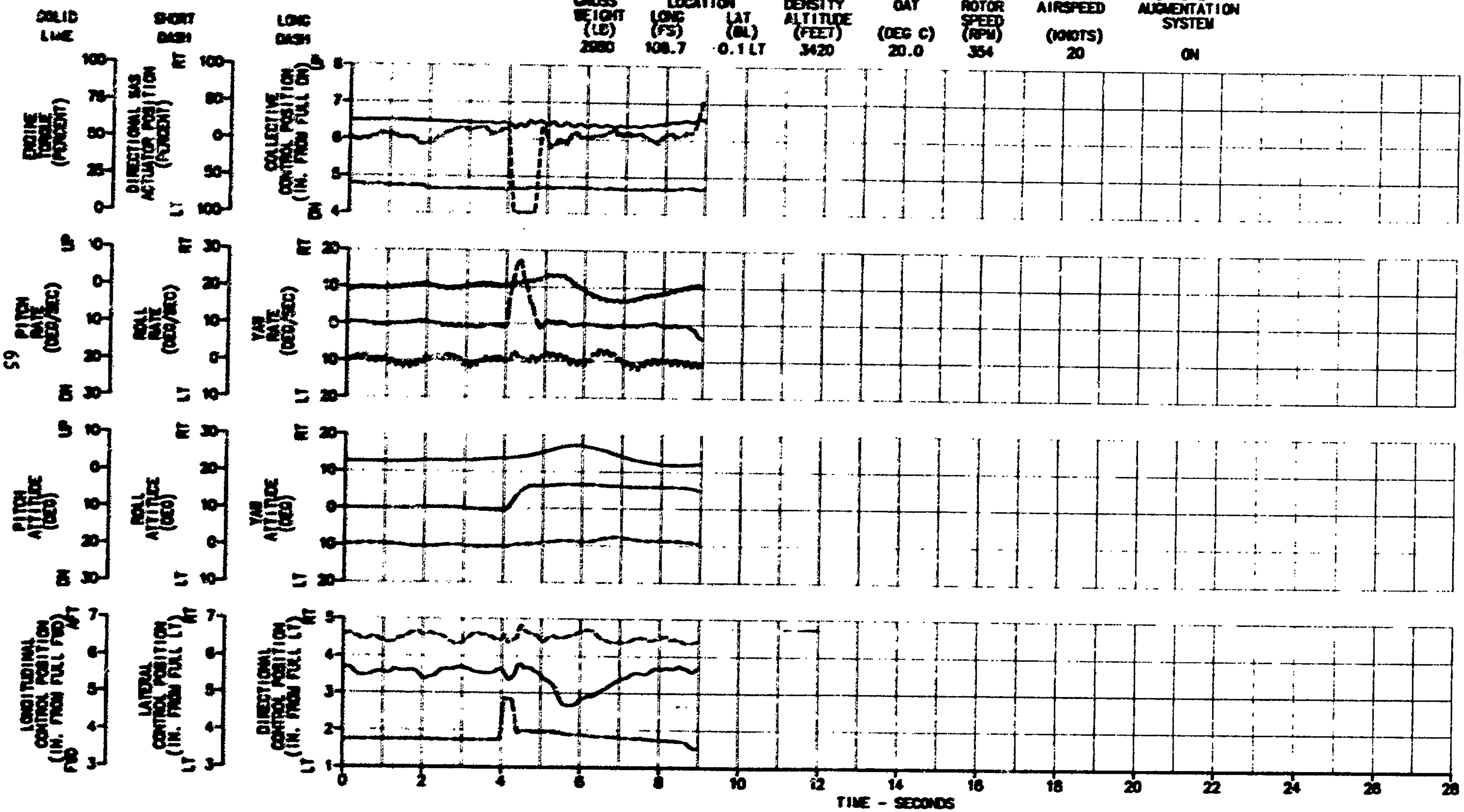


FIGURE E-30
RIGHT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	108.7	0.1 LT	3370	19.5	353	20	OFF

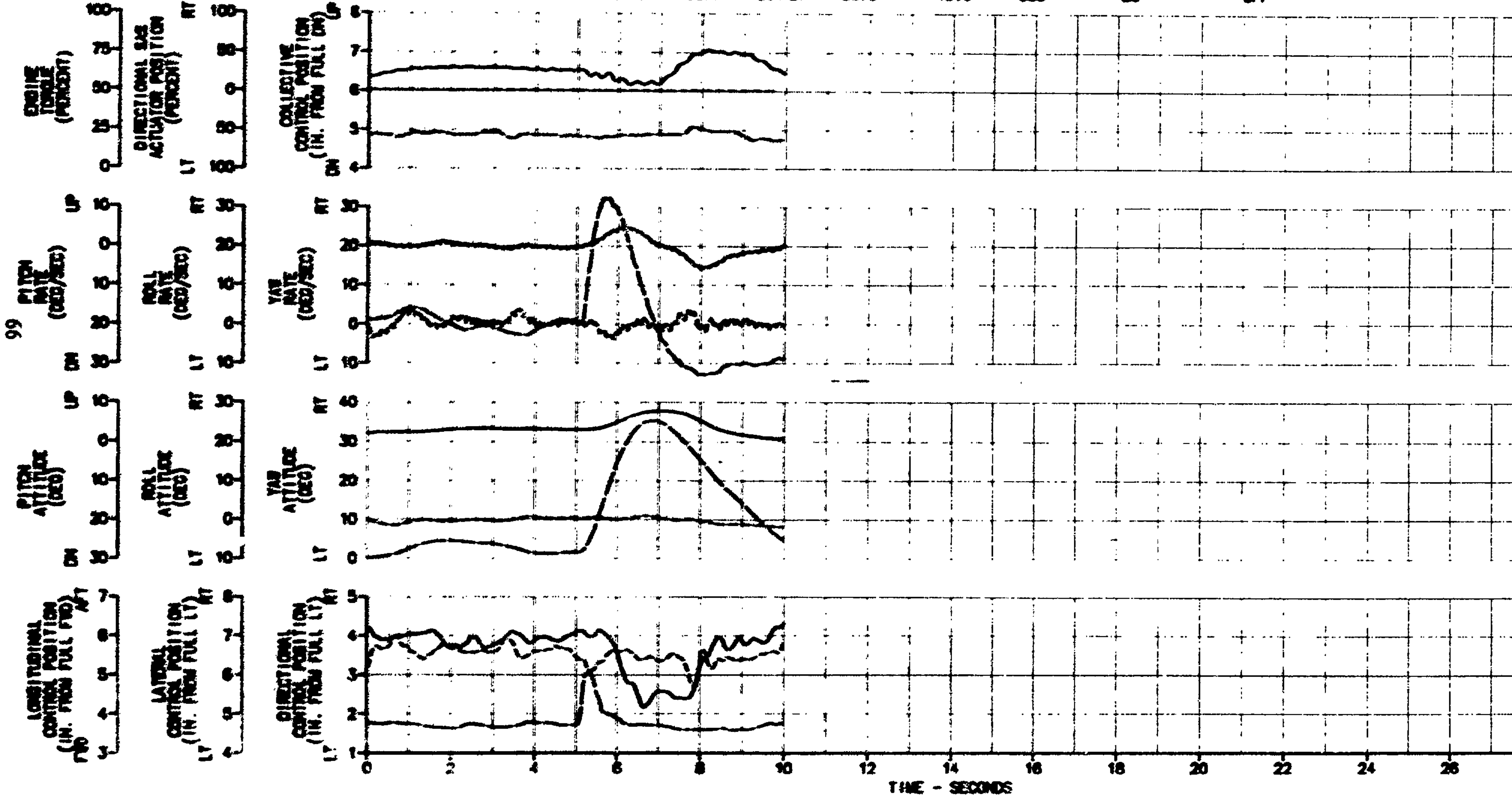


FIGURE E-31
LEFT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	108.7	0.1 LT	3420	20.0	354	30	ON

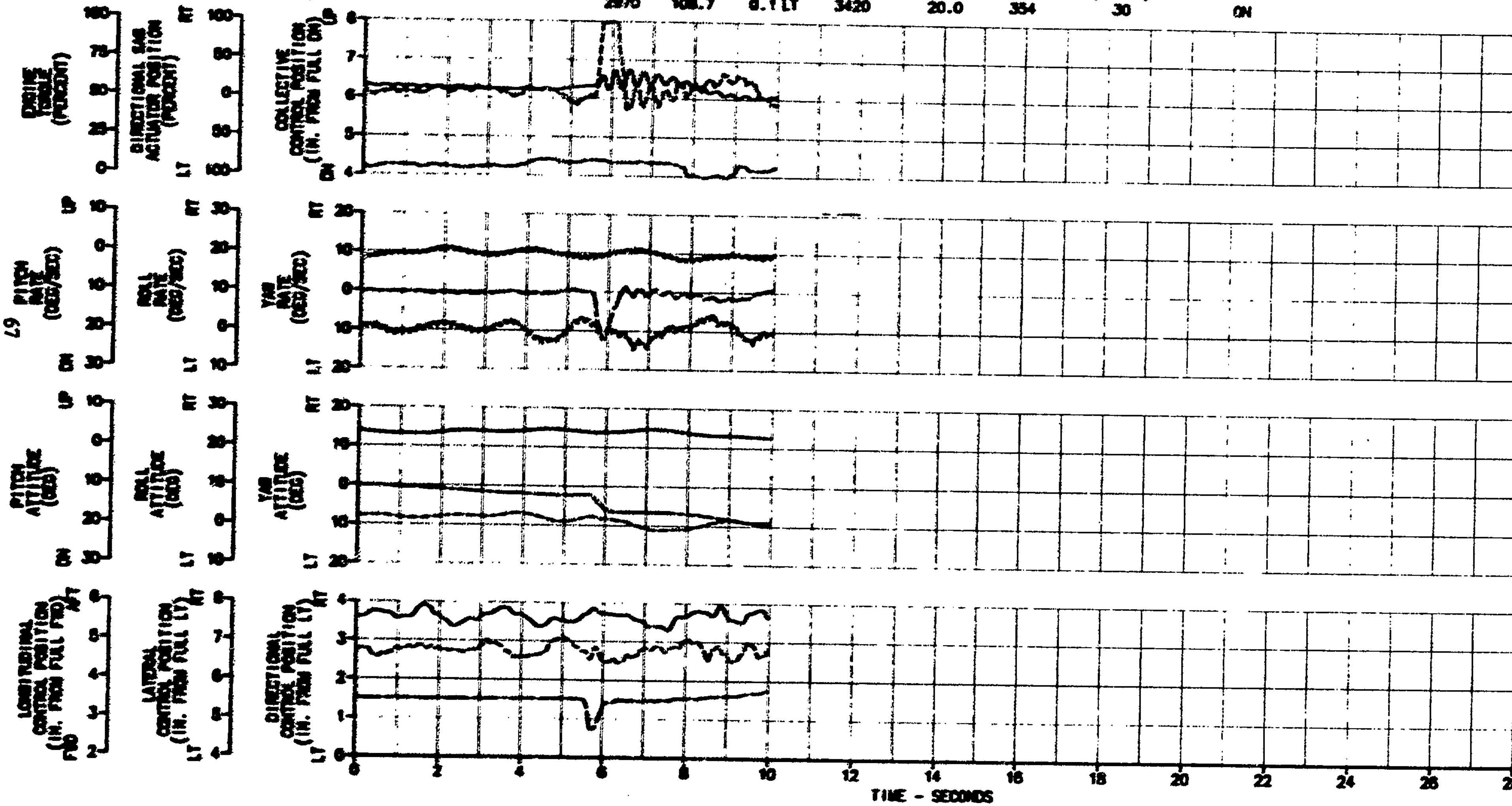


FIGURE E-32

LEFT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH

JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	108.6	0.1 LT	3360	19.5	355	30	OFF

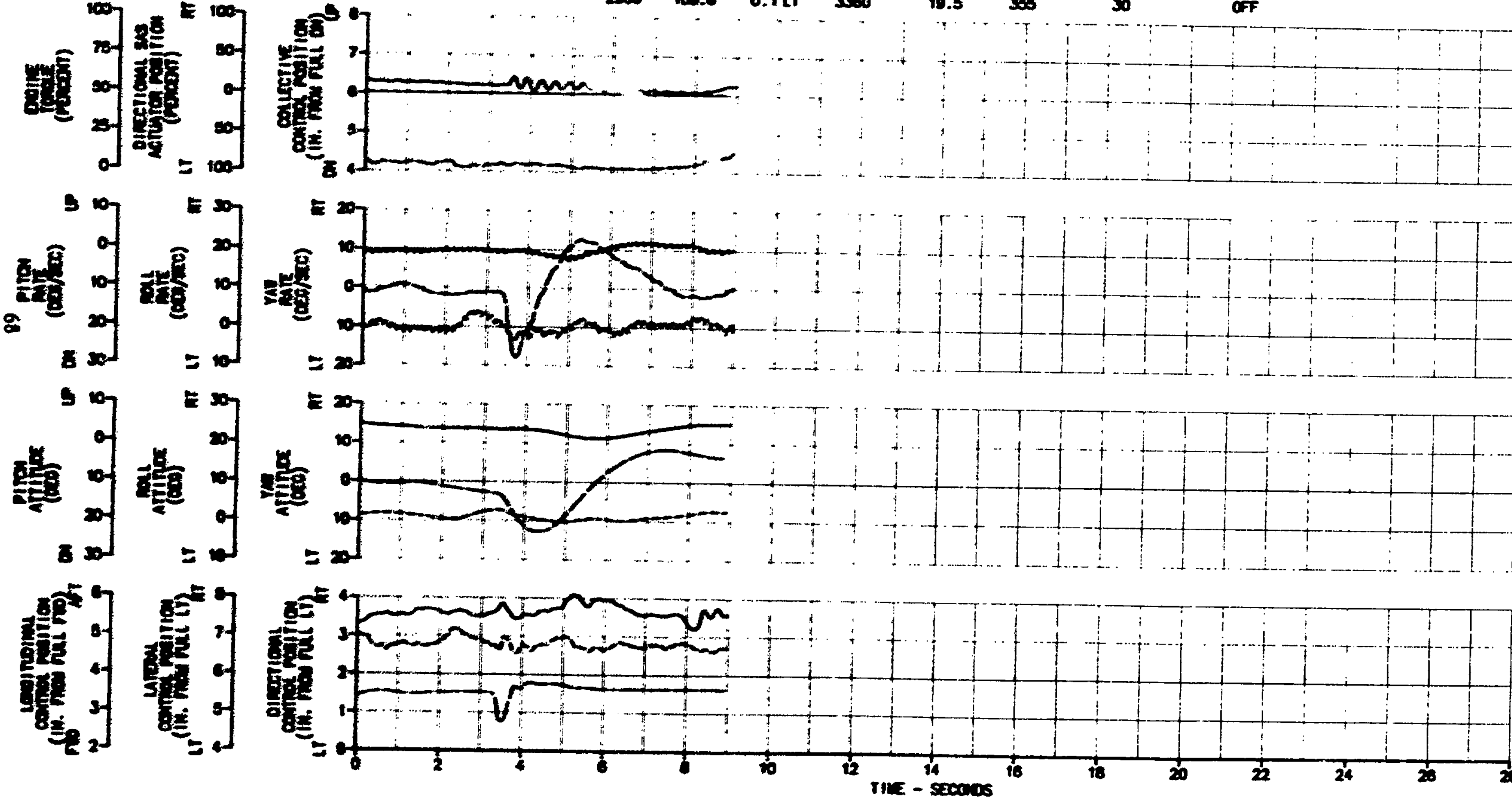


FIGURE E-33
RIGHT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	108.7	0.1 LT	3380	20.0	356	30	ON

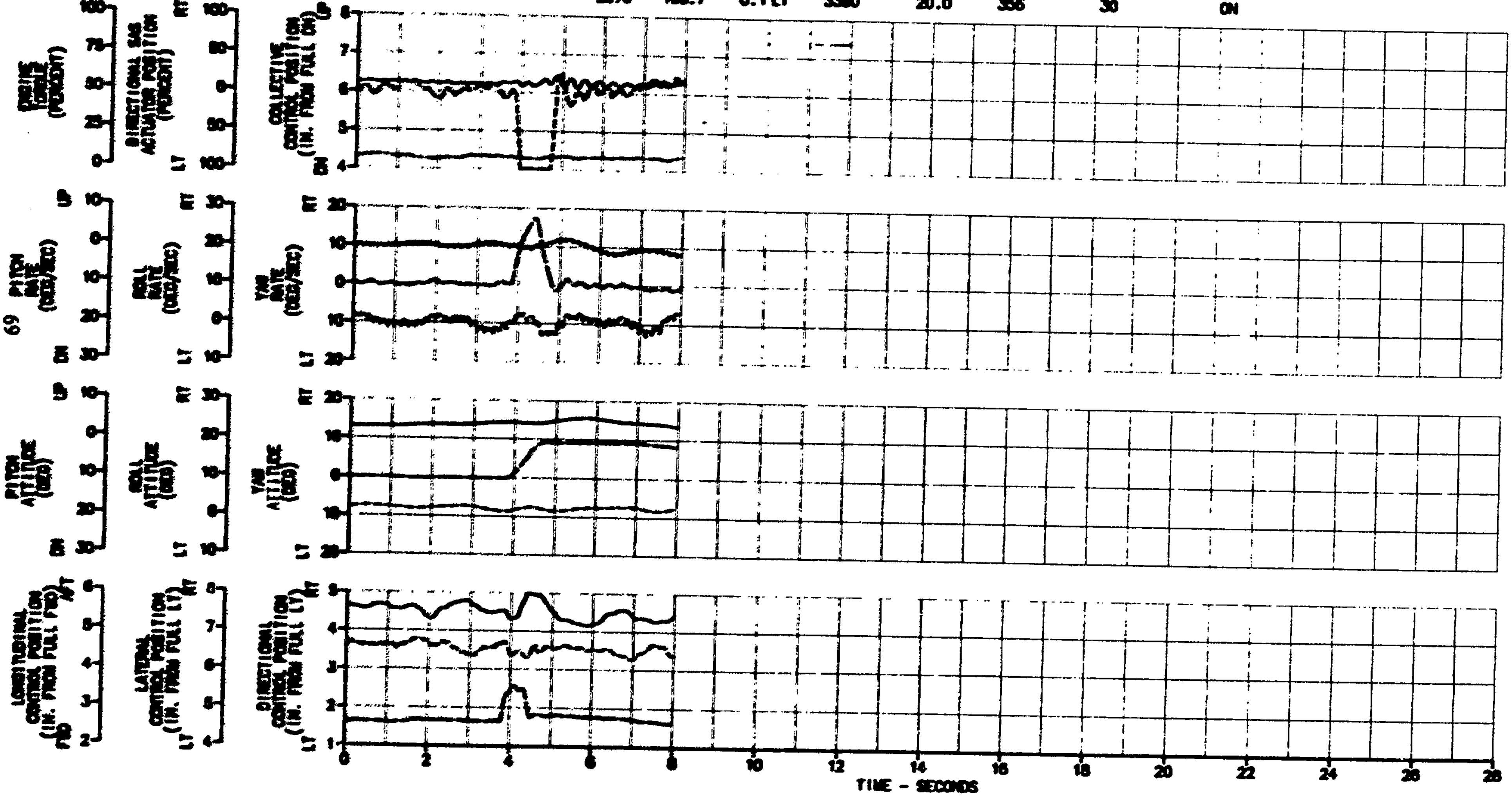


FIGURE E-34
RIGHT DIRECTIONAL PULSE INPUT - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

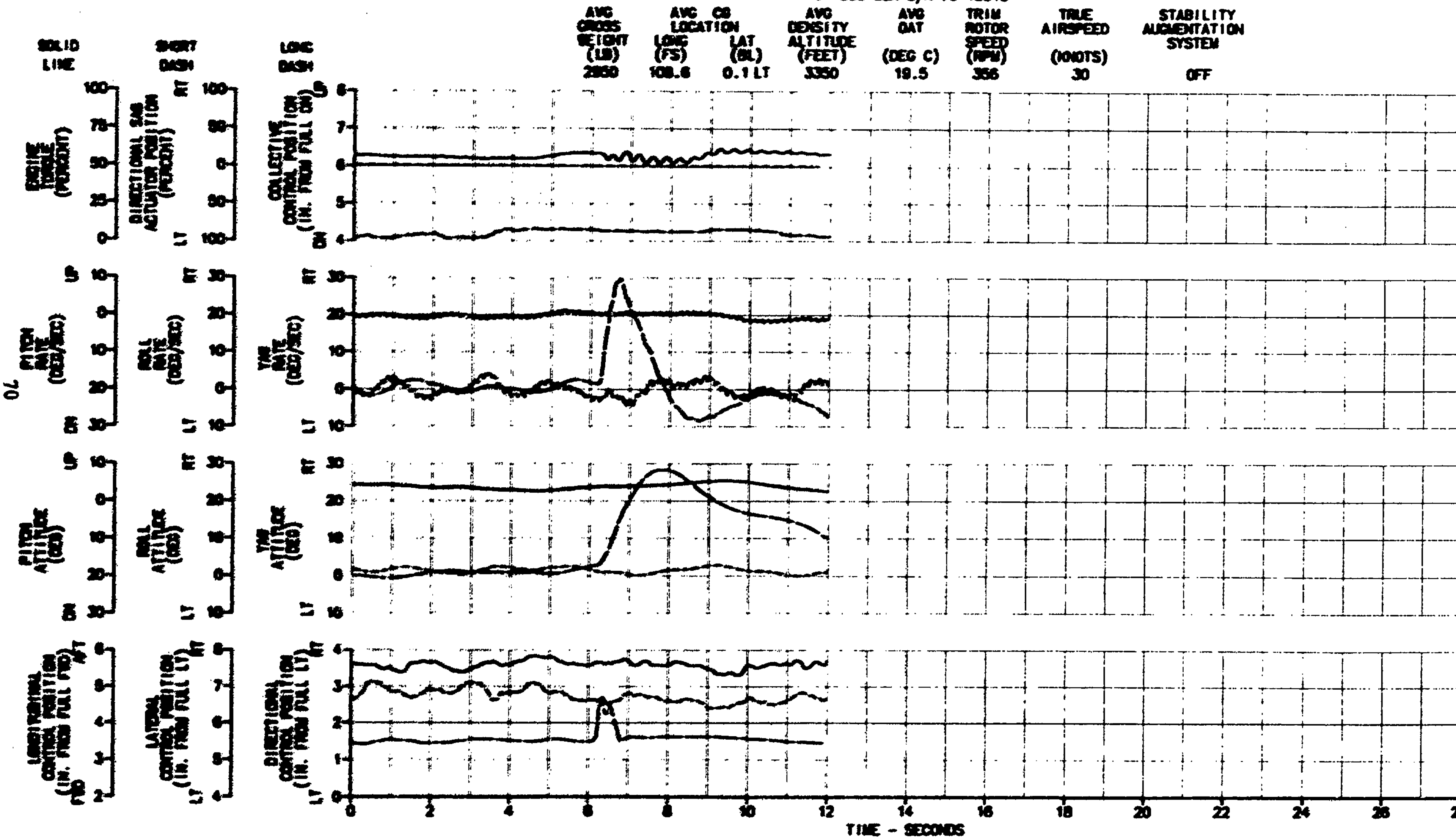


FIGURE E-41
RIGHT DIRECTIONAL PULSE INPUT - 120 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

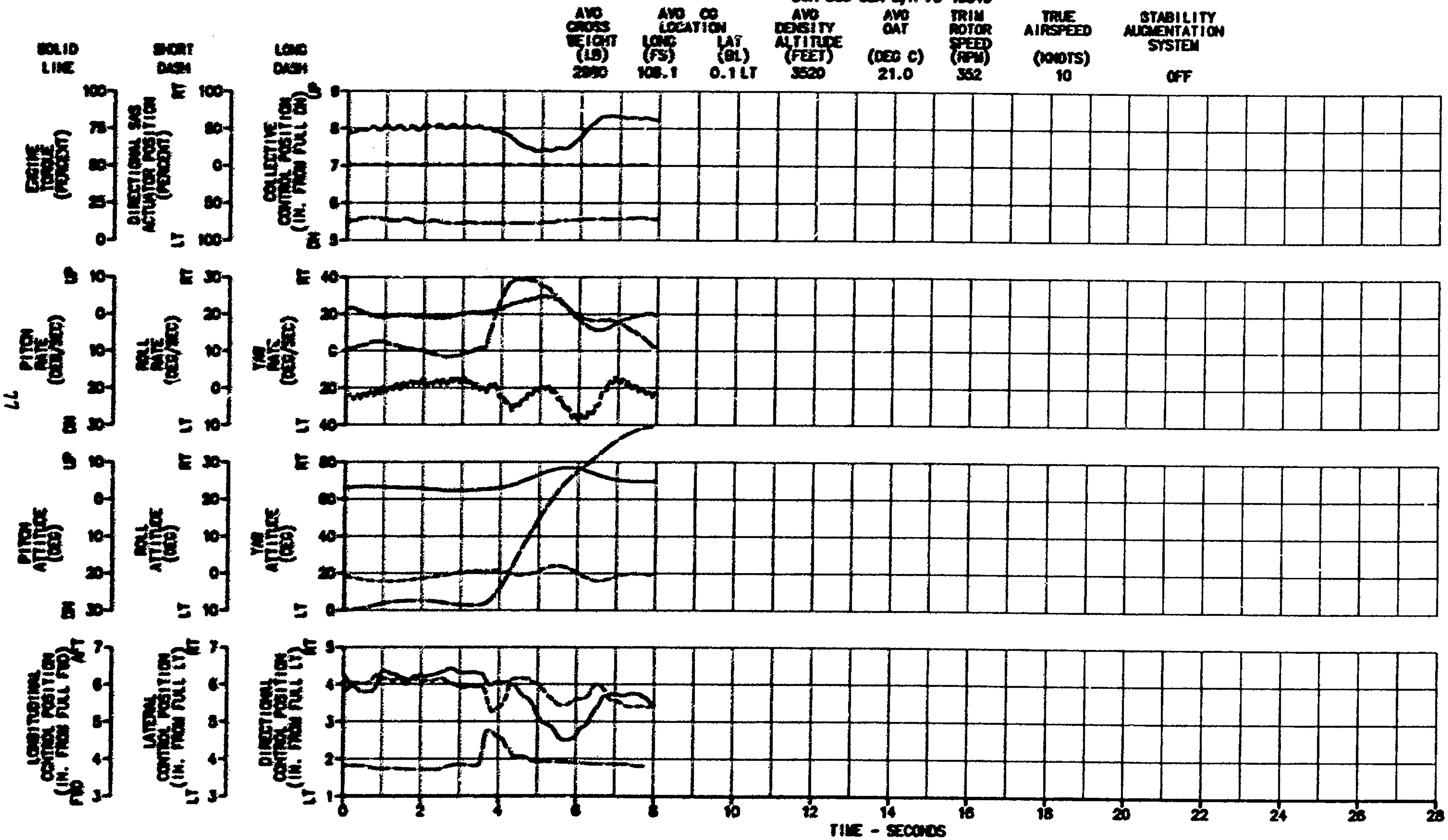


FIGURE E-42
LEFT DIRECTIONAL PULSE INPUT - 120 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

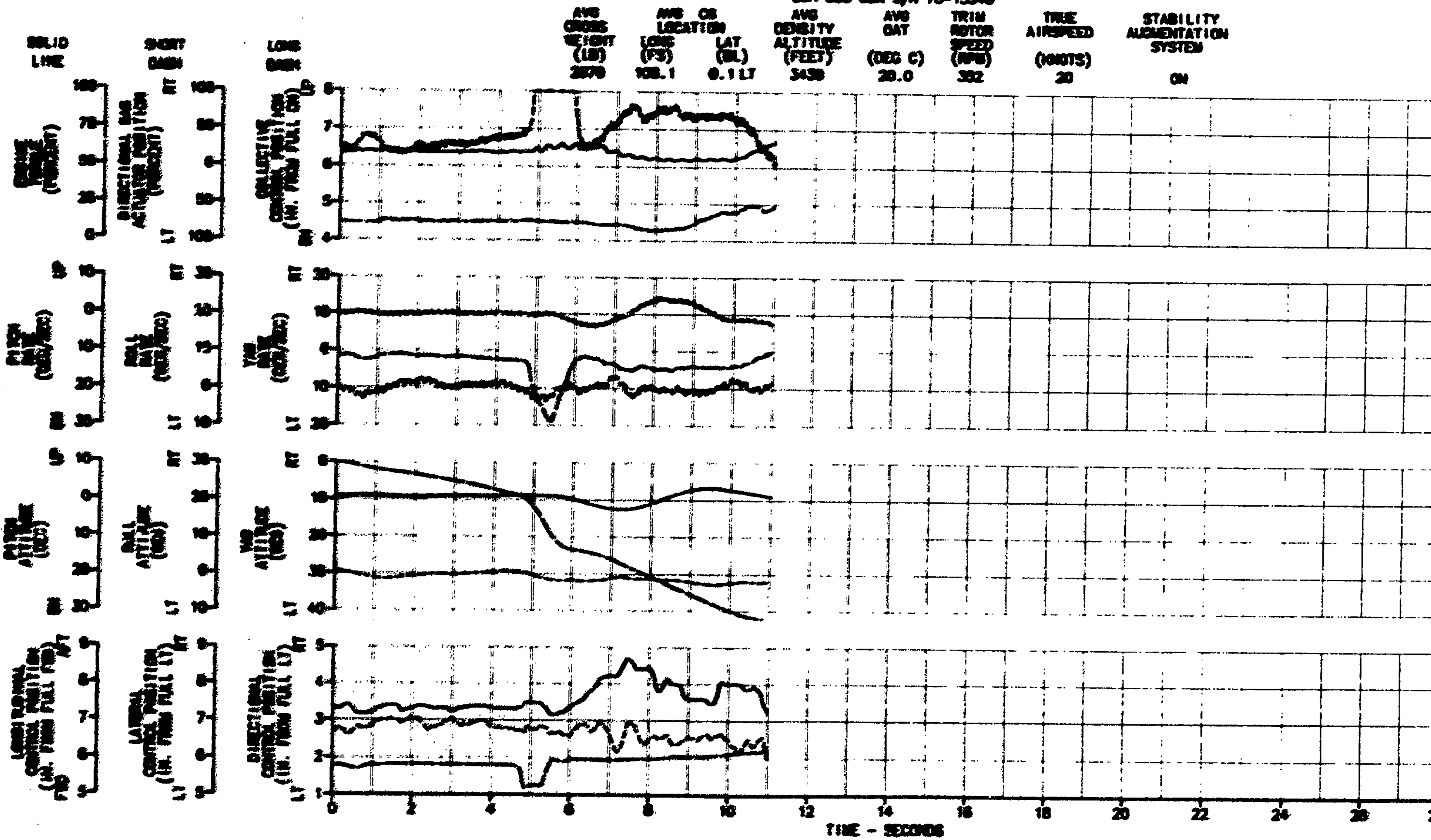


FIGURE E-43
LEFT DIRECTIONAL PULSE INPUT - 120 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	108.0	0.1 LT	3450	20.5	355	20	OFF

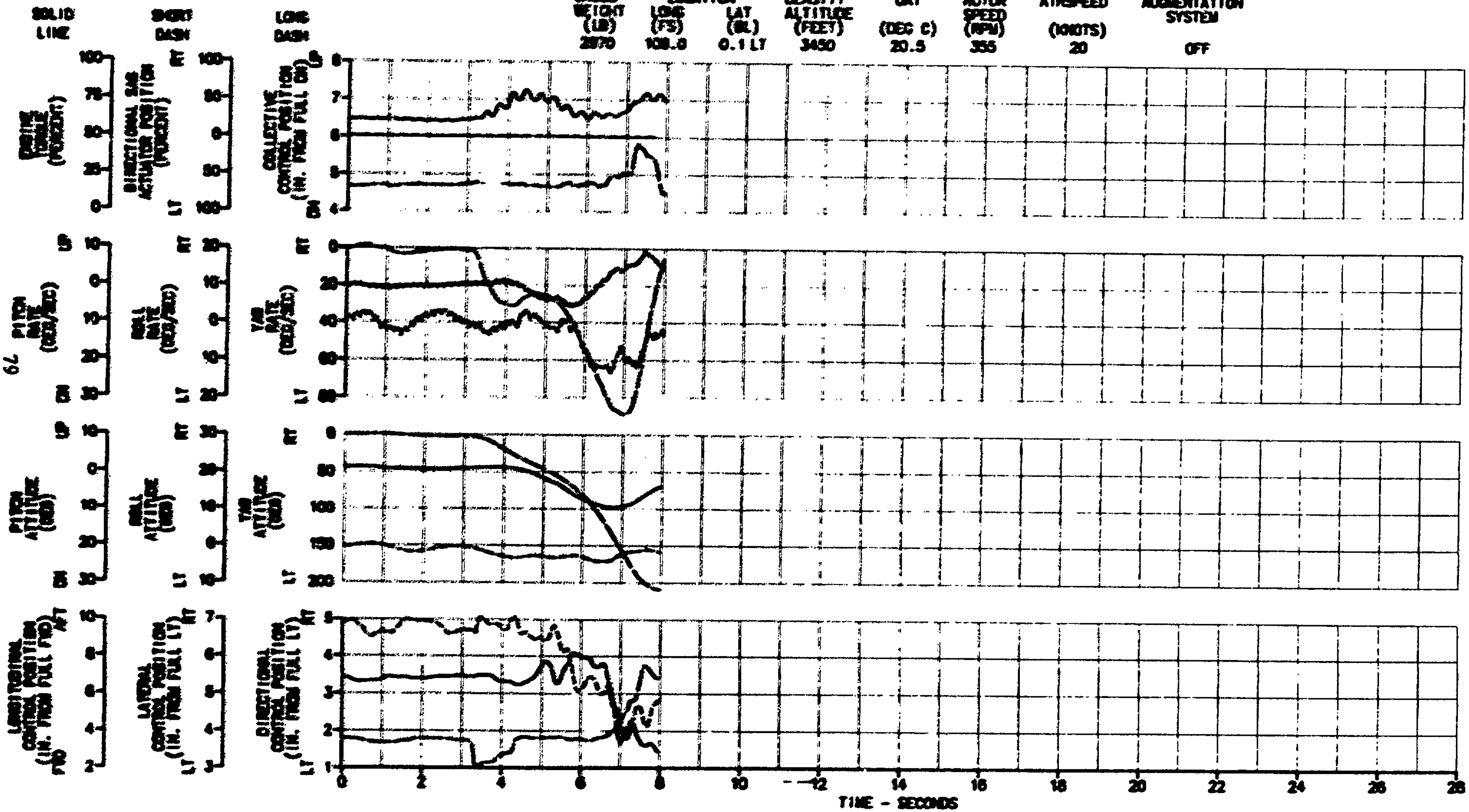


FIGURE E-44
RIGHT DIRECTIONAL PULSE INPUT - 120 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	108.0	0.1 LT	3420	20.0	353	20	ON

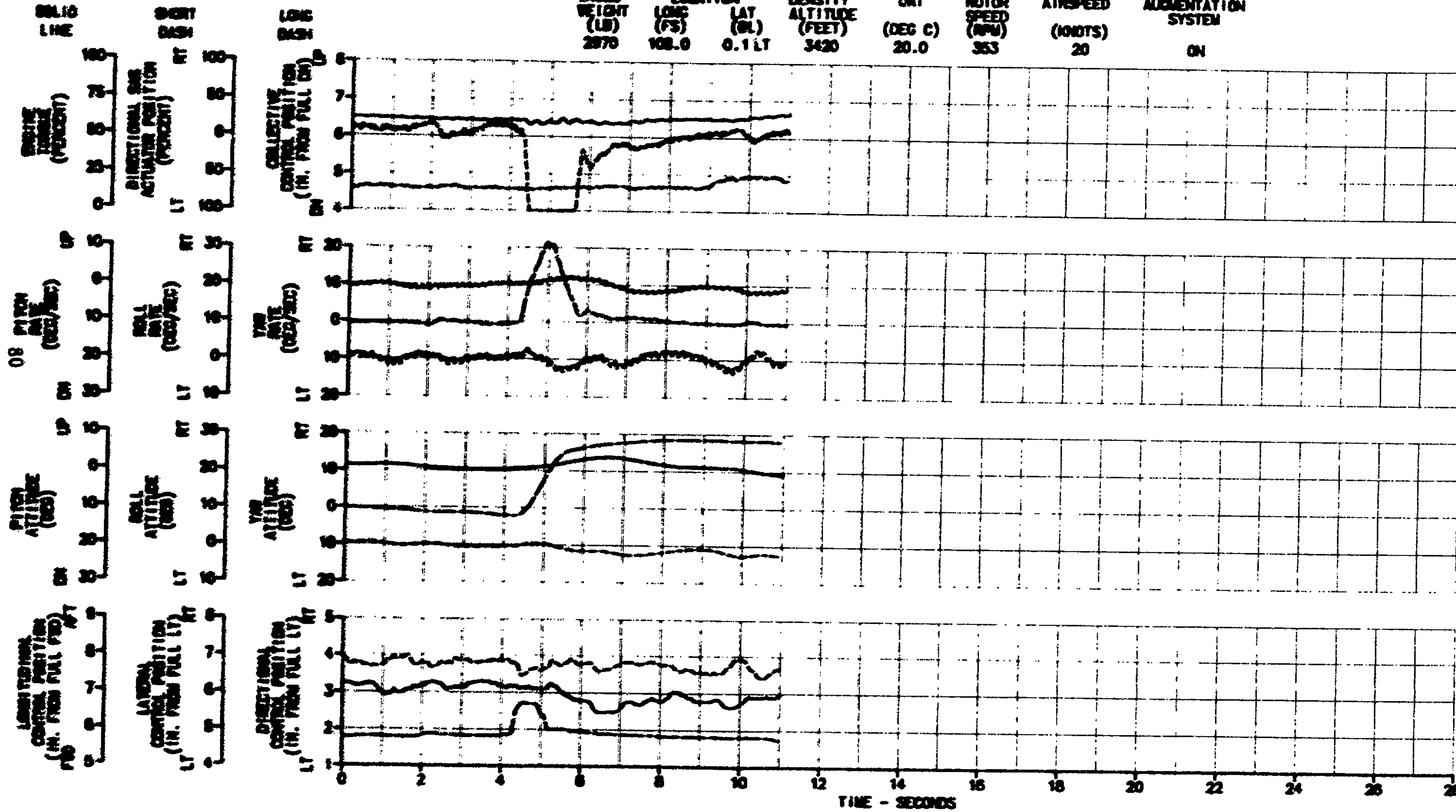


FIGURE E-45
RIGHT DIRECTIONAL PULSE INPUT - 120 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
[illegible]	[illegible]	0.1 LT	3370	19.5	354	20	OFF

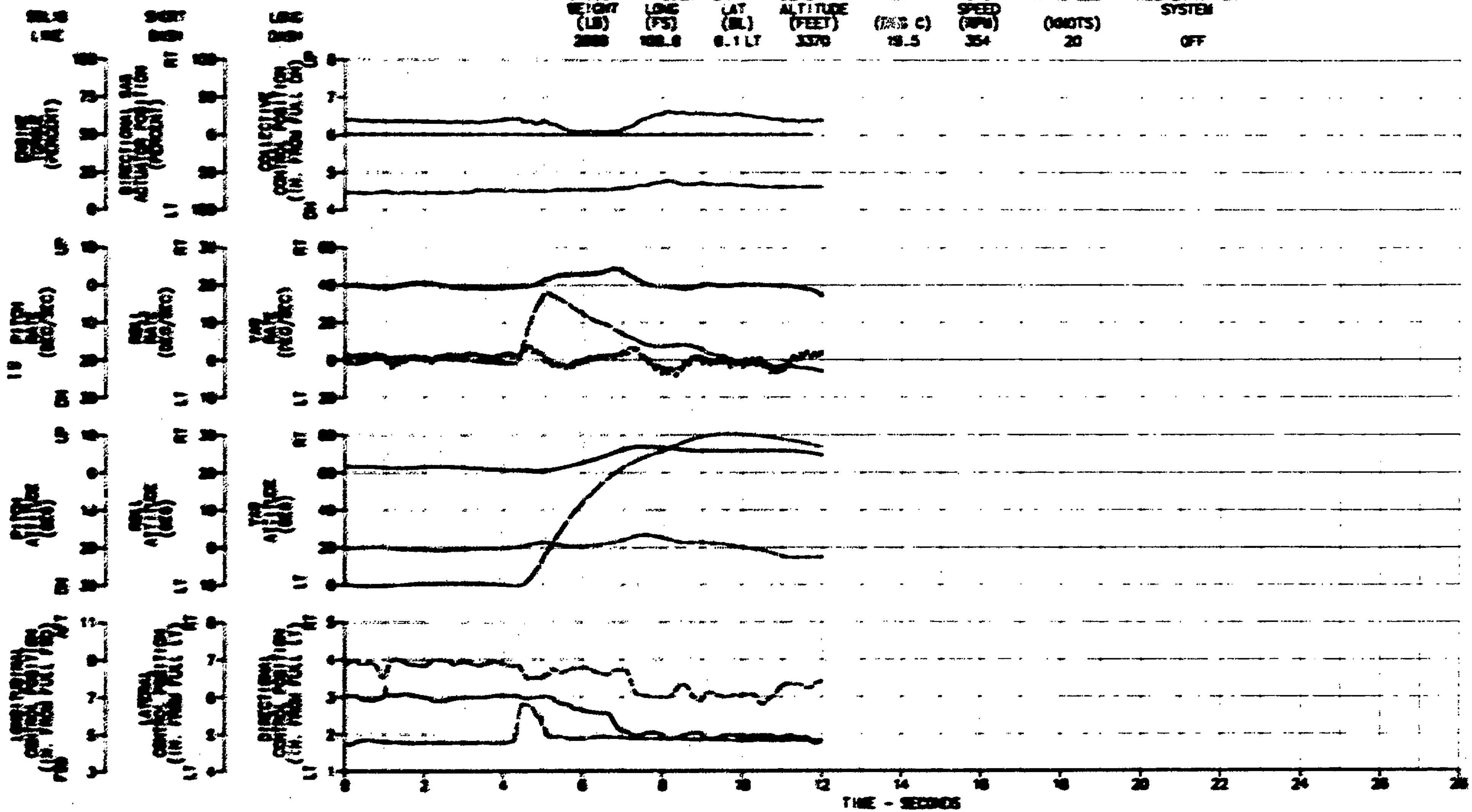


FIGURE C-48
LEFT DIRECTIONAL PULSE INPUT - 120 DEGREE AZIMUTH
JOH-58C UBA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	106.0	0.1 LT	3430	20.0	353	30	ON

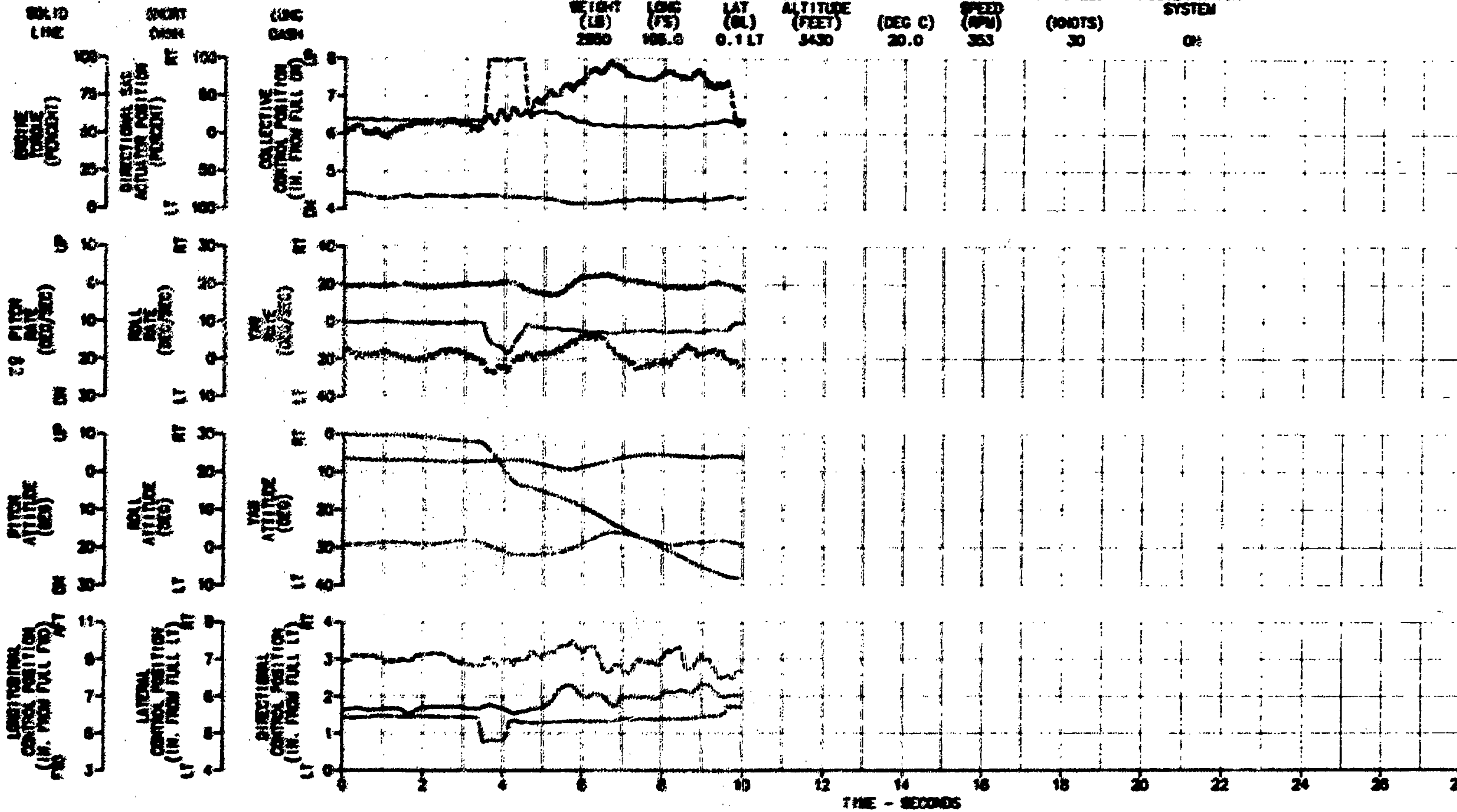


FIGURE E-47
RIGHT DIRECTIONAL PULSE INPUT - 120 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	107.6	-0.1 LT	3430	20.0	353	30	ON

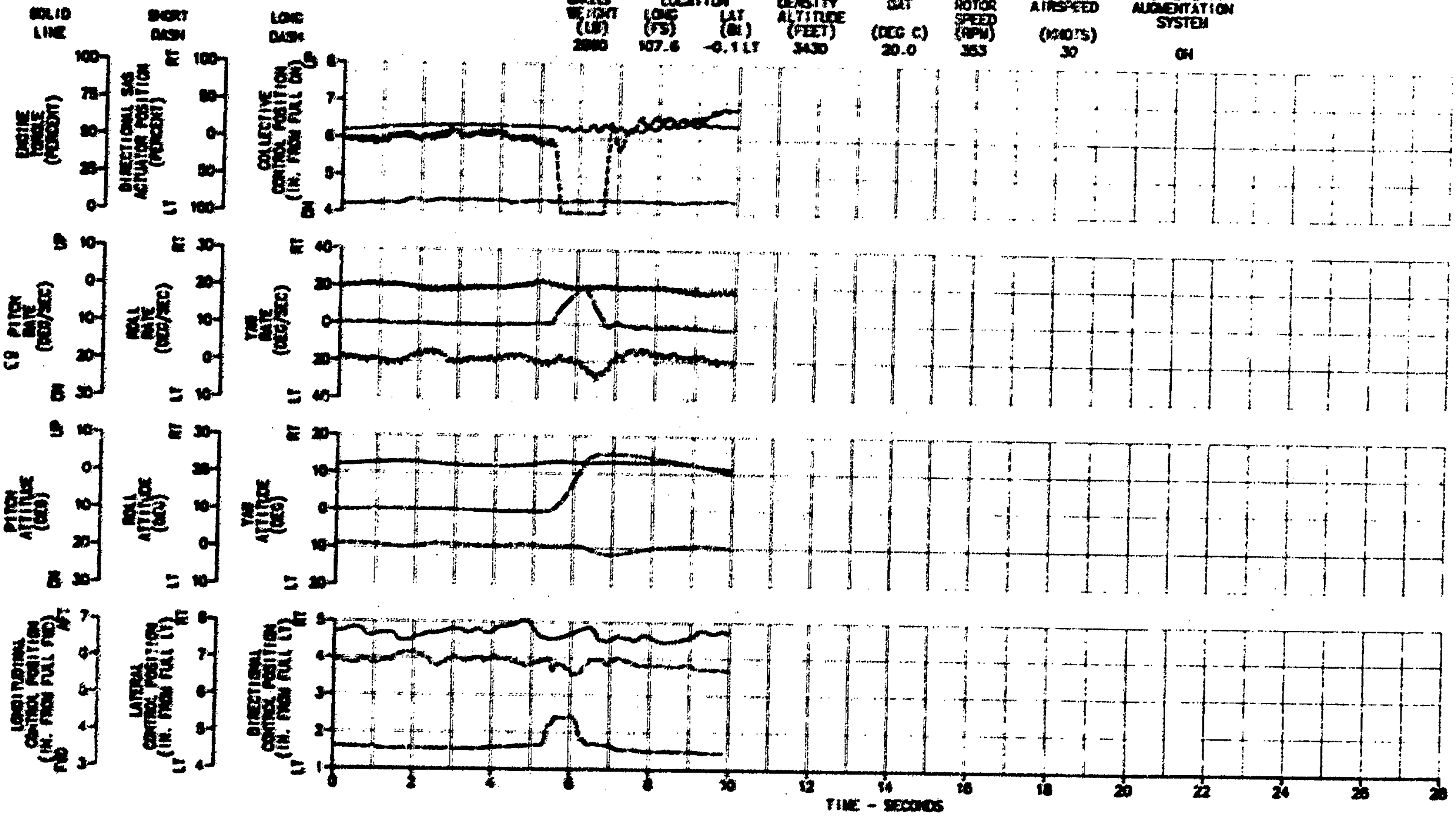


FIGURE E-48
RIGHT DIRECTIONAL PULSE INPUT - 120 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	107.6	0.1 LT	3470	20.5	353	30	OFF

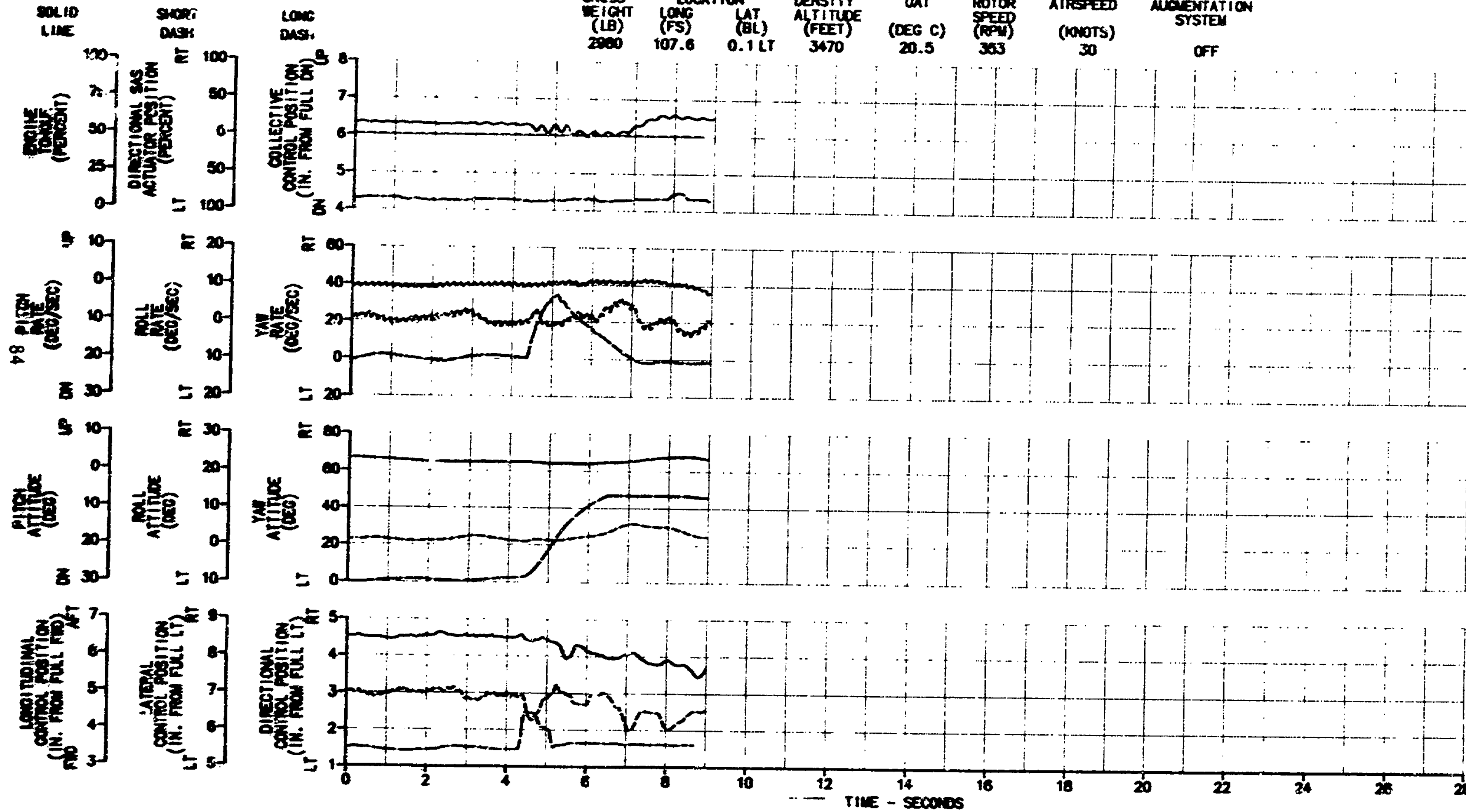


FIGURE E-49
LEFT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

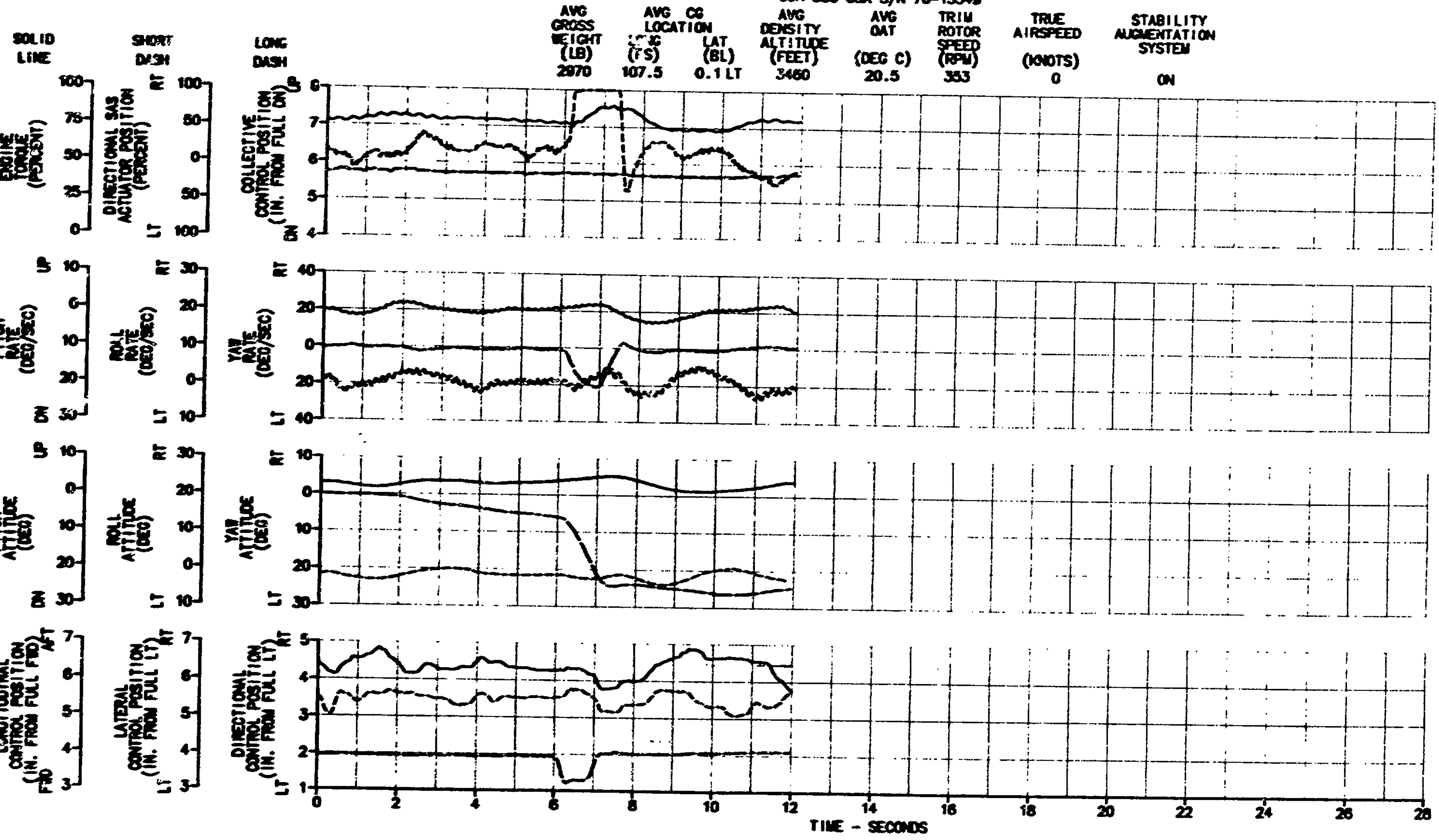


FIGURE E-50
LEFT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	107.5	0.1 LT	3520	21.0	352	0	OFF

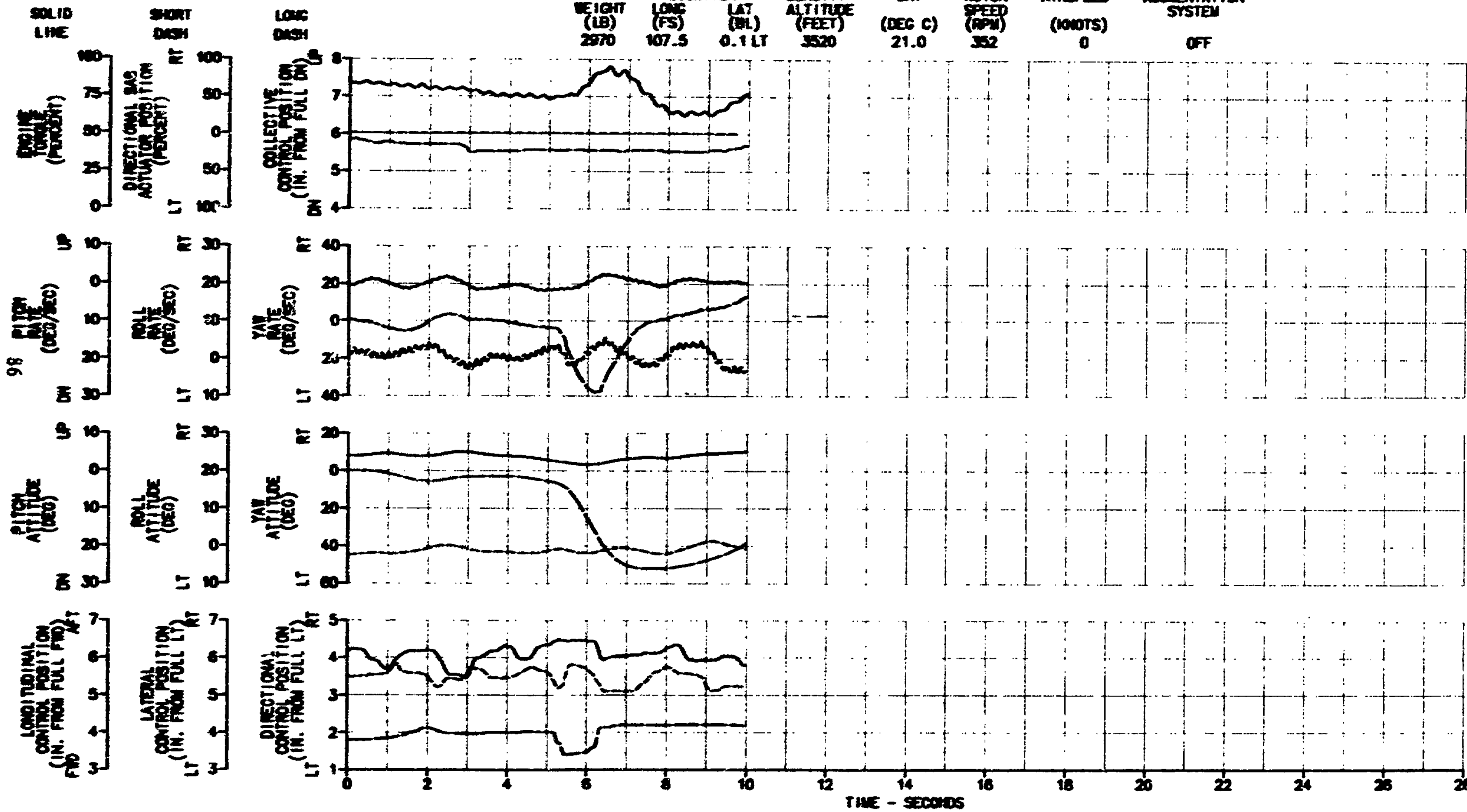


FIGURE E-51
RIGHT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	107.5	0.1 LT	3470	20.5	353	0	ON

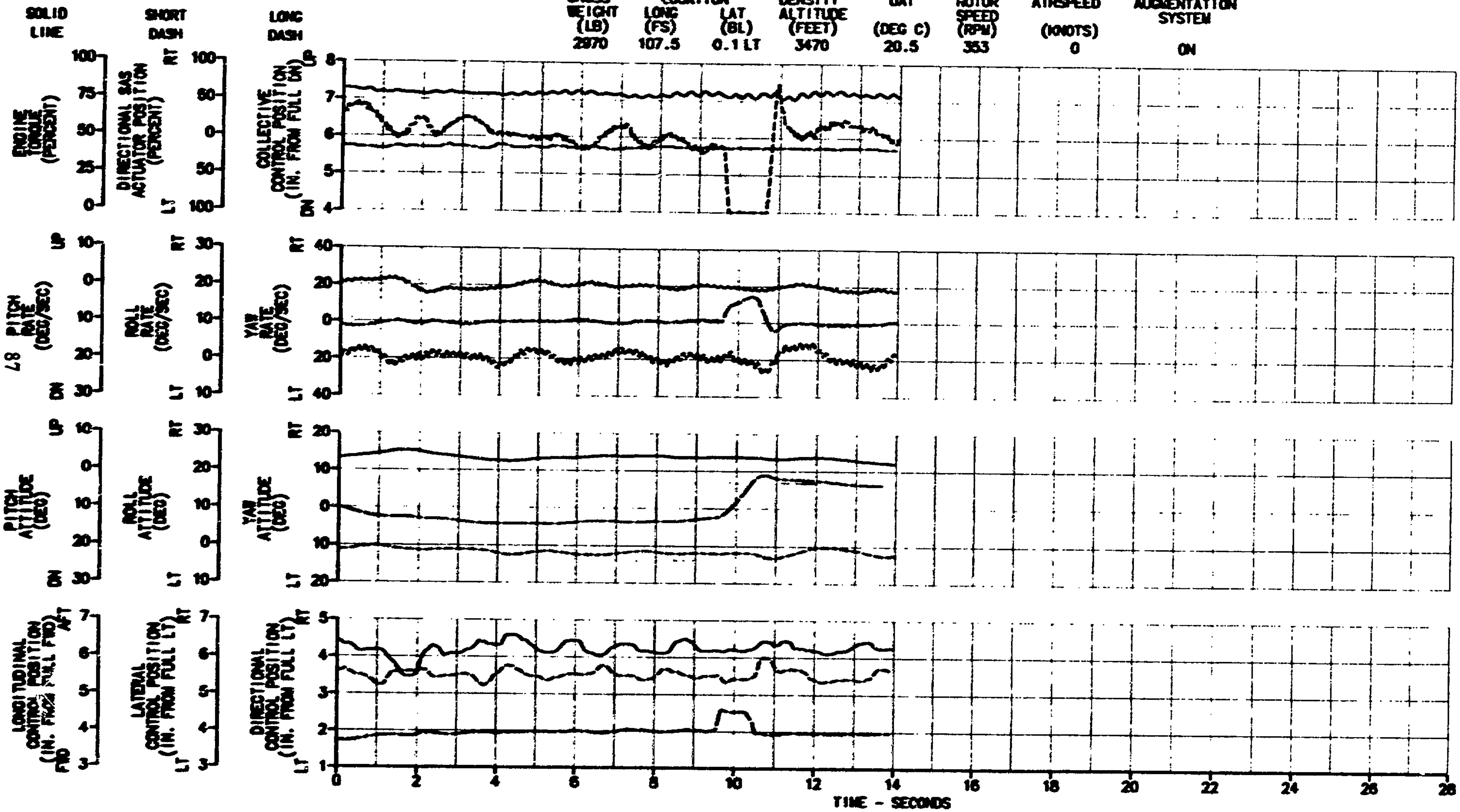


FIGURE E-52
RIGHT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

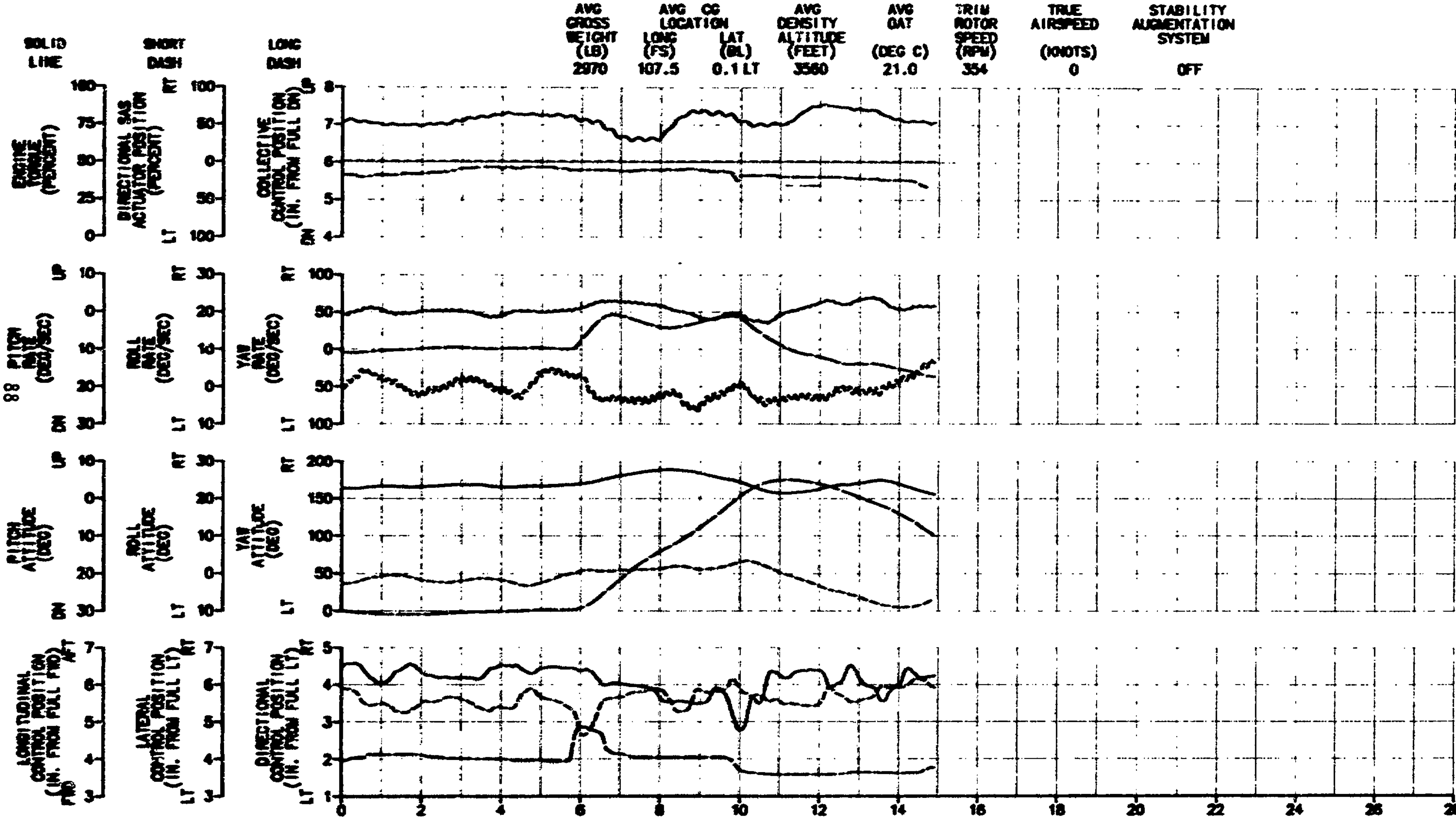


FIGURE E-53
LEFT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

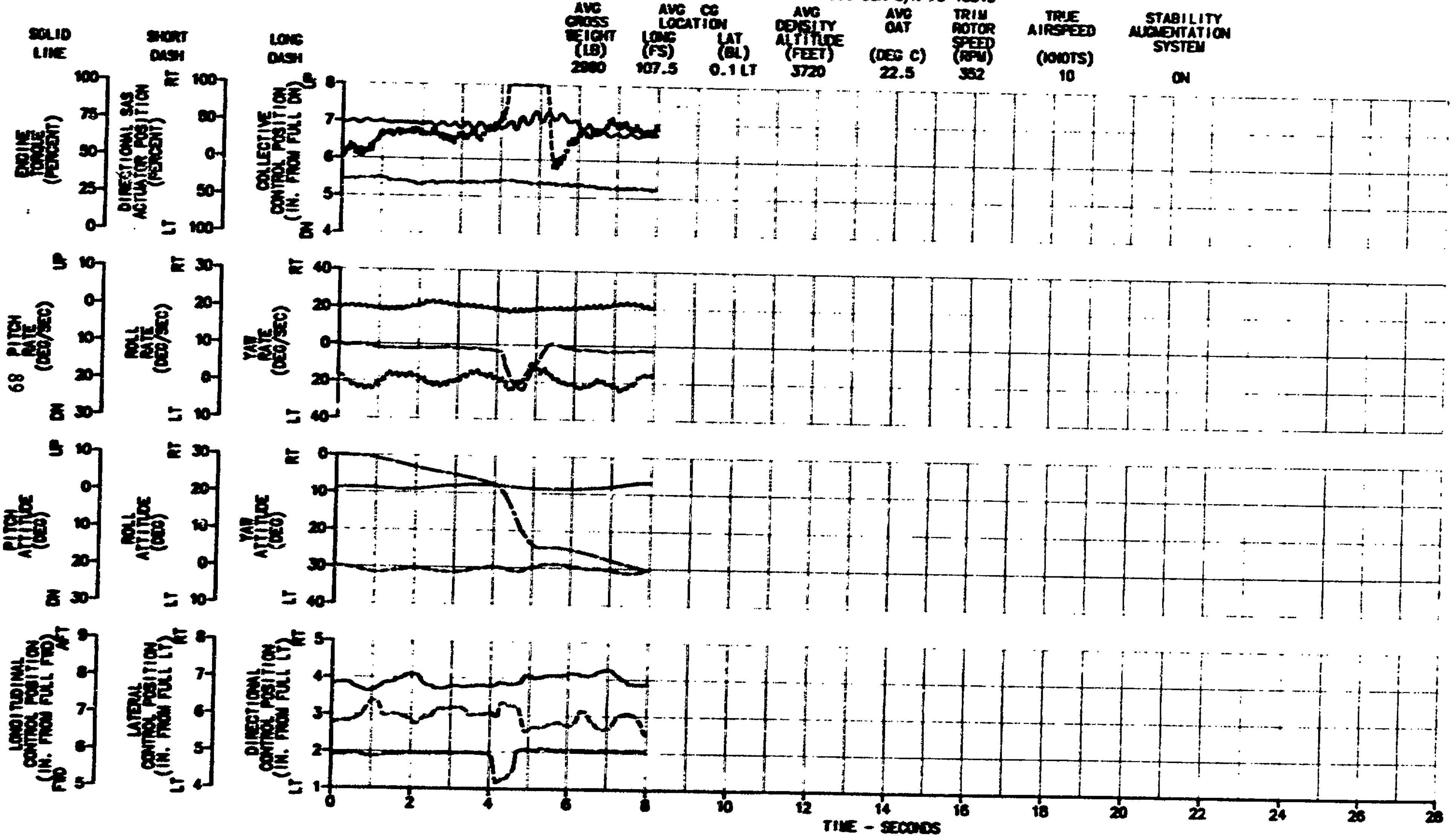


FIGURE E-54
LEFT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

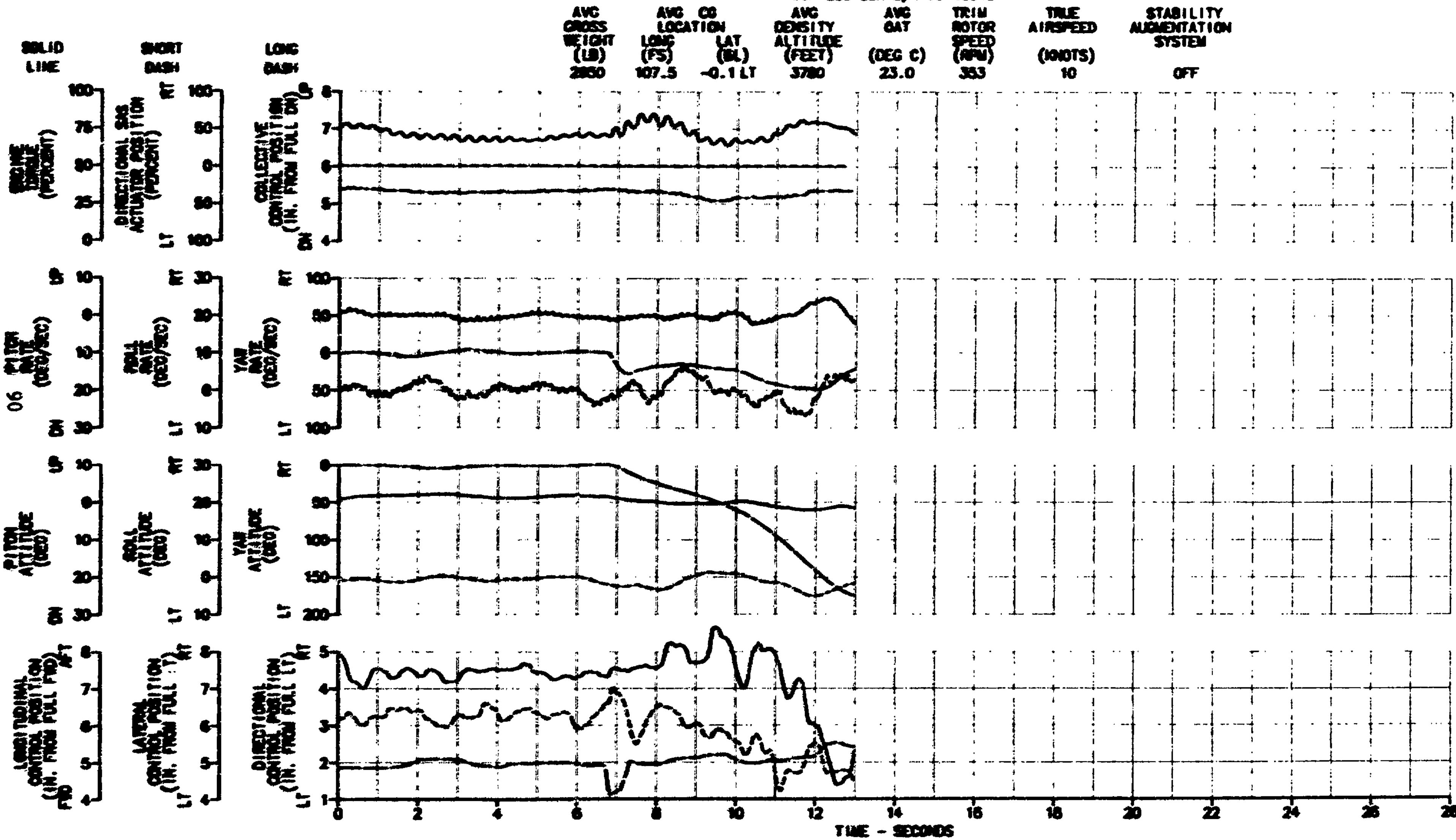


FIGURE E-55
RIGHT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2860	107.5	0.1 LT	3760	23.0	355	10	ON

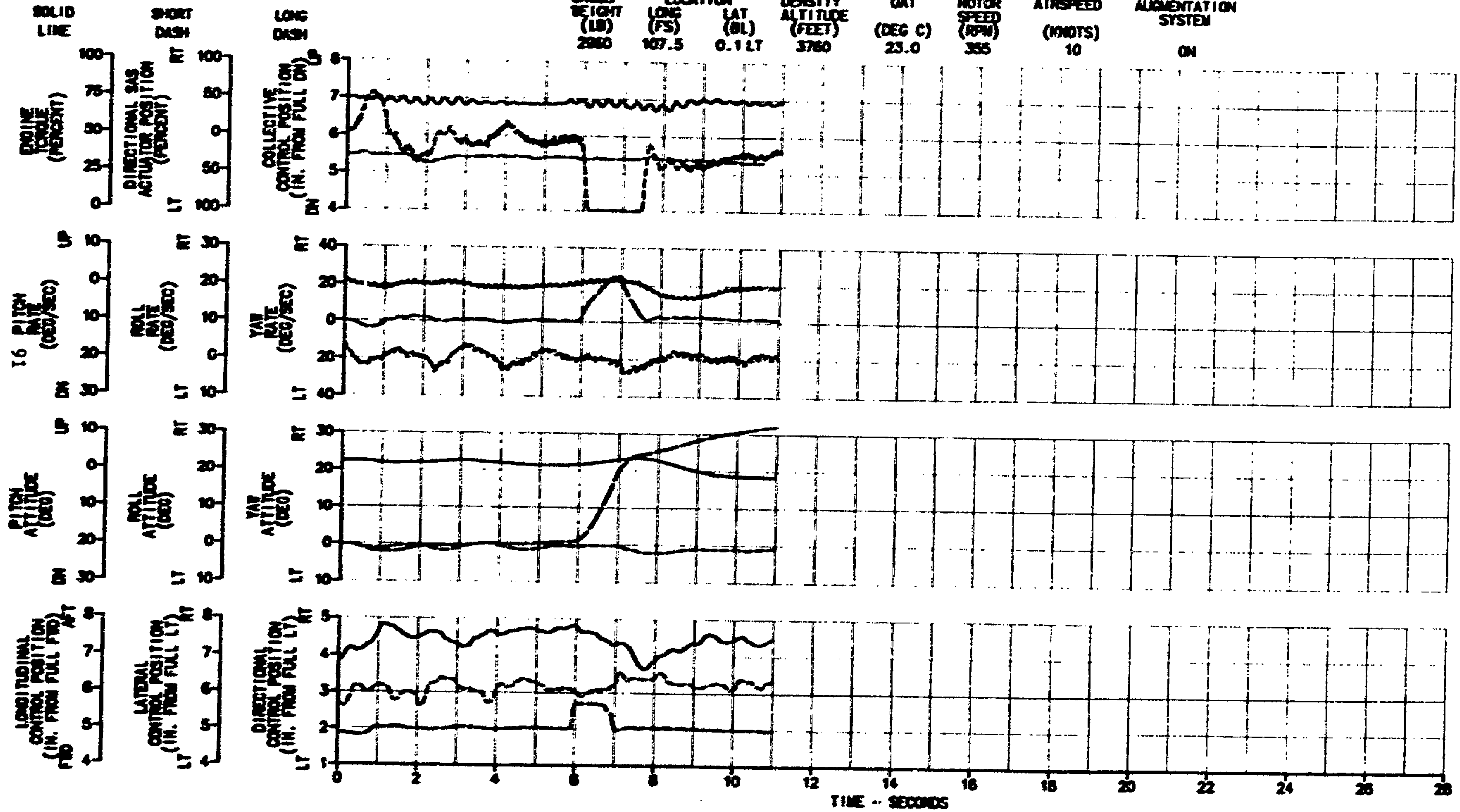


FIGURE E-56
RIGHT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2850	137.5	0.1 LT	3770	23.0	352	10	OFF

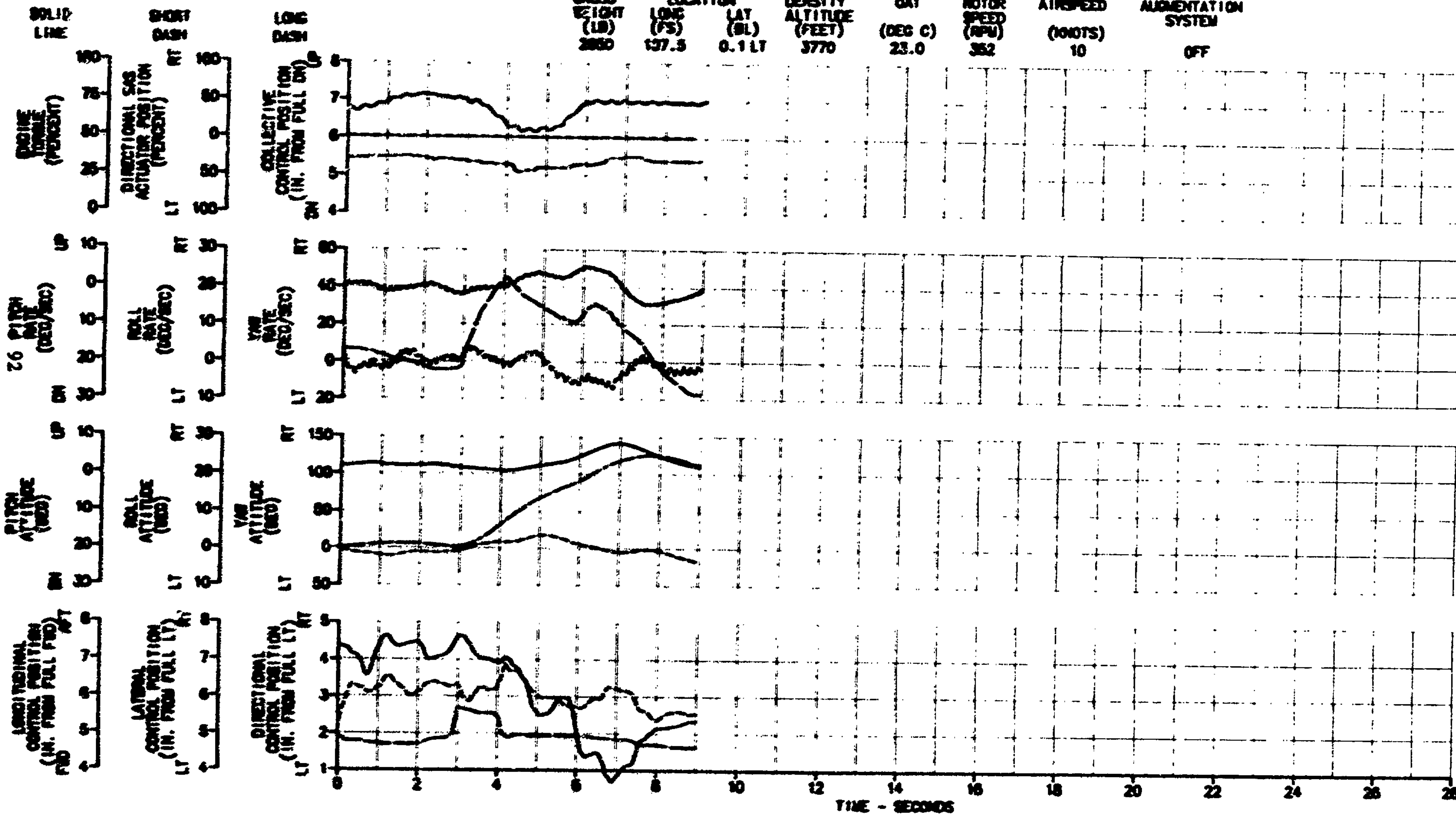


FIGURE E-57
LEFT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

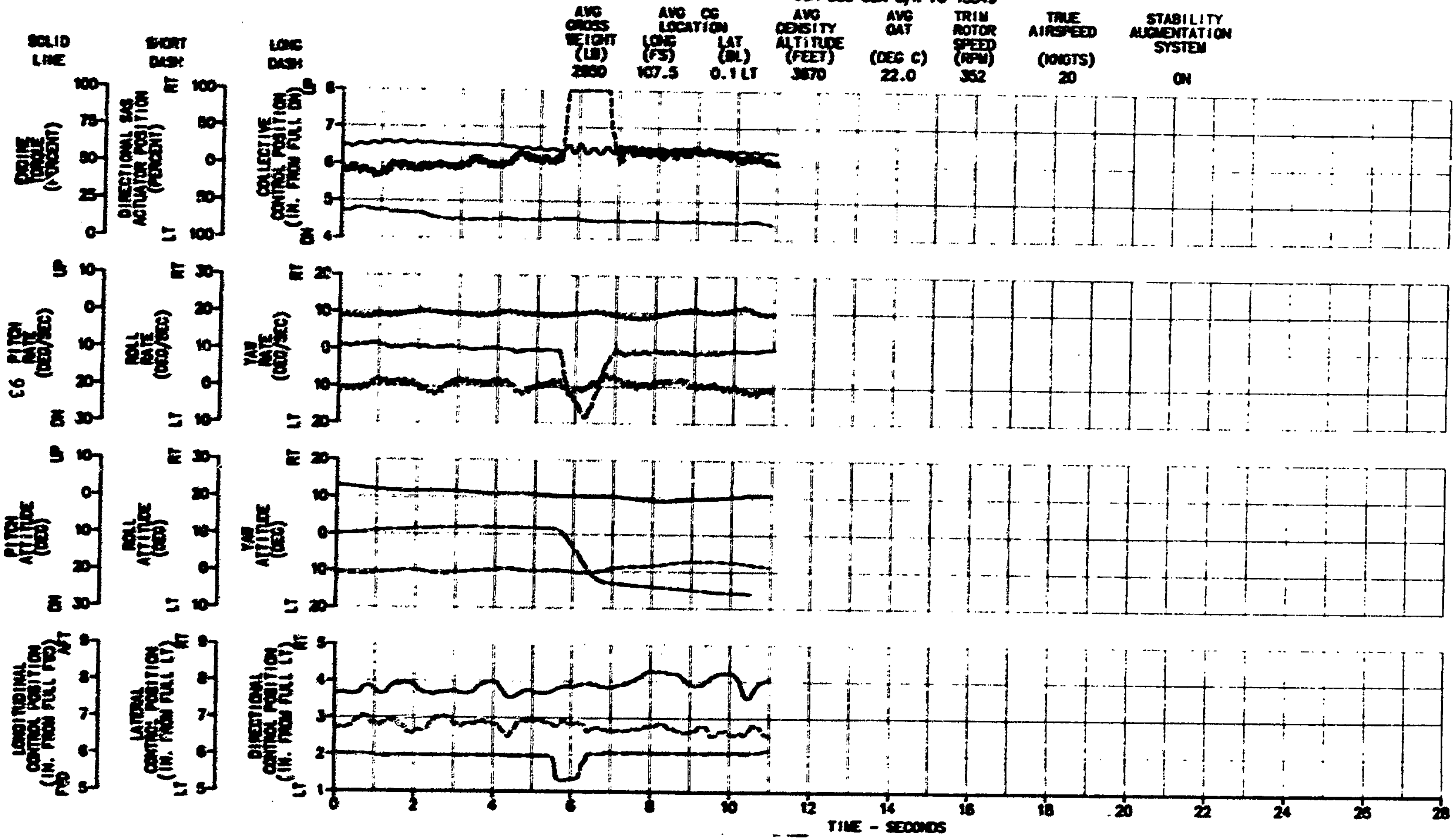


FIGURE E-58
LEFT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	117.1	0.1 LT	3580	21.5	353	21	OFF

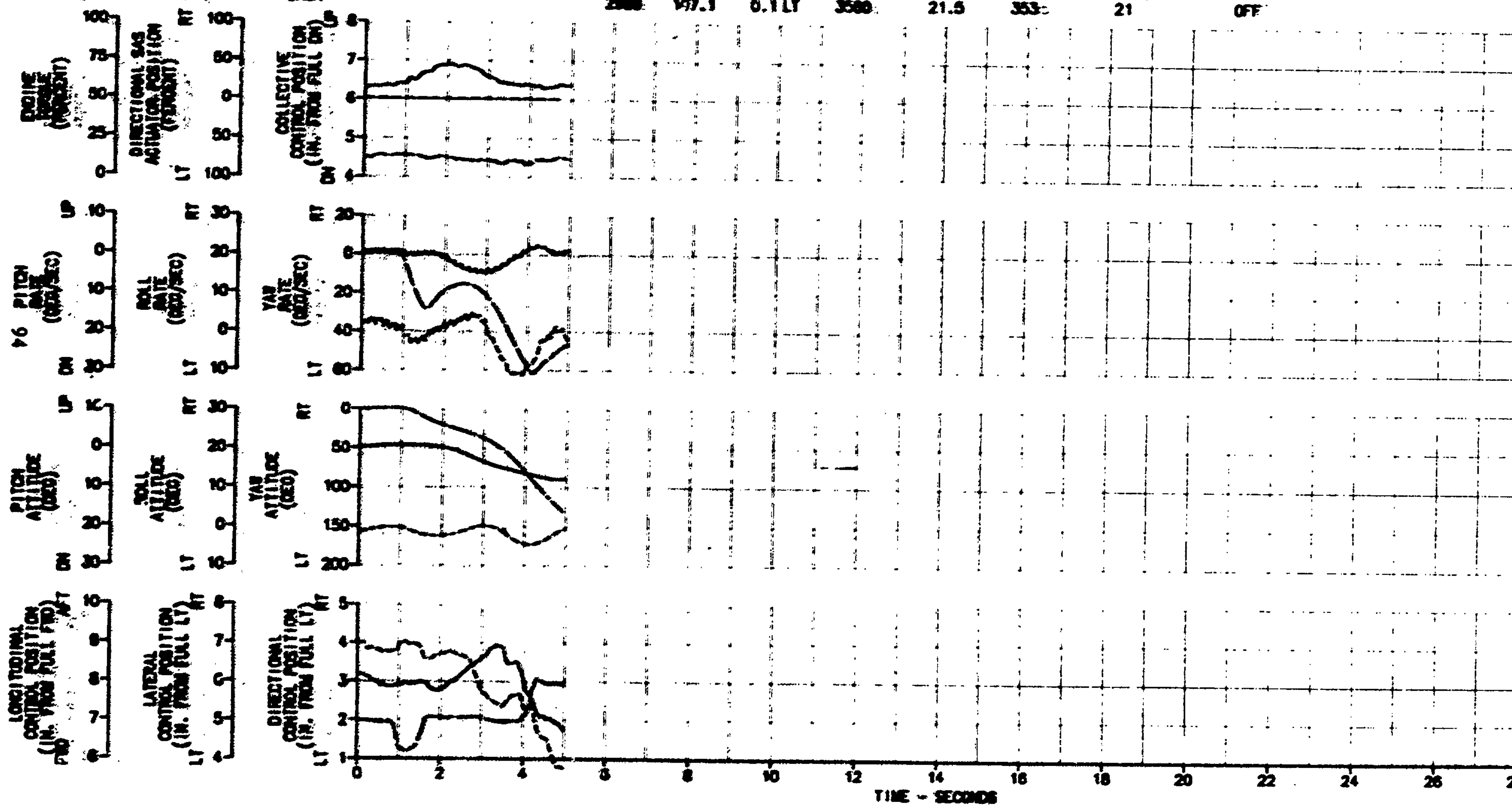


FIGURE E-50
RIGHT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

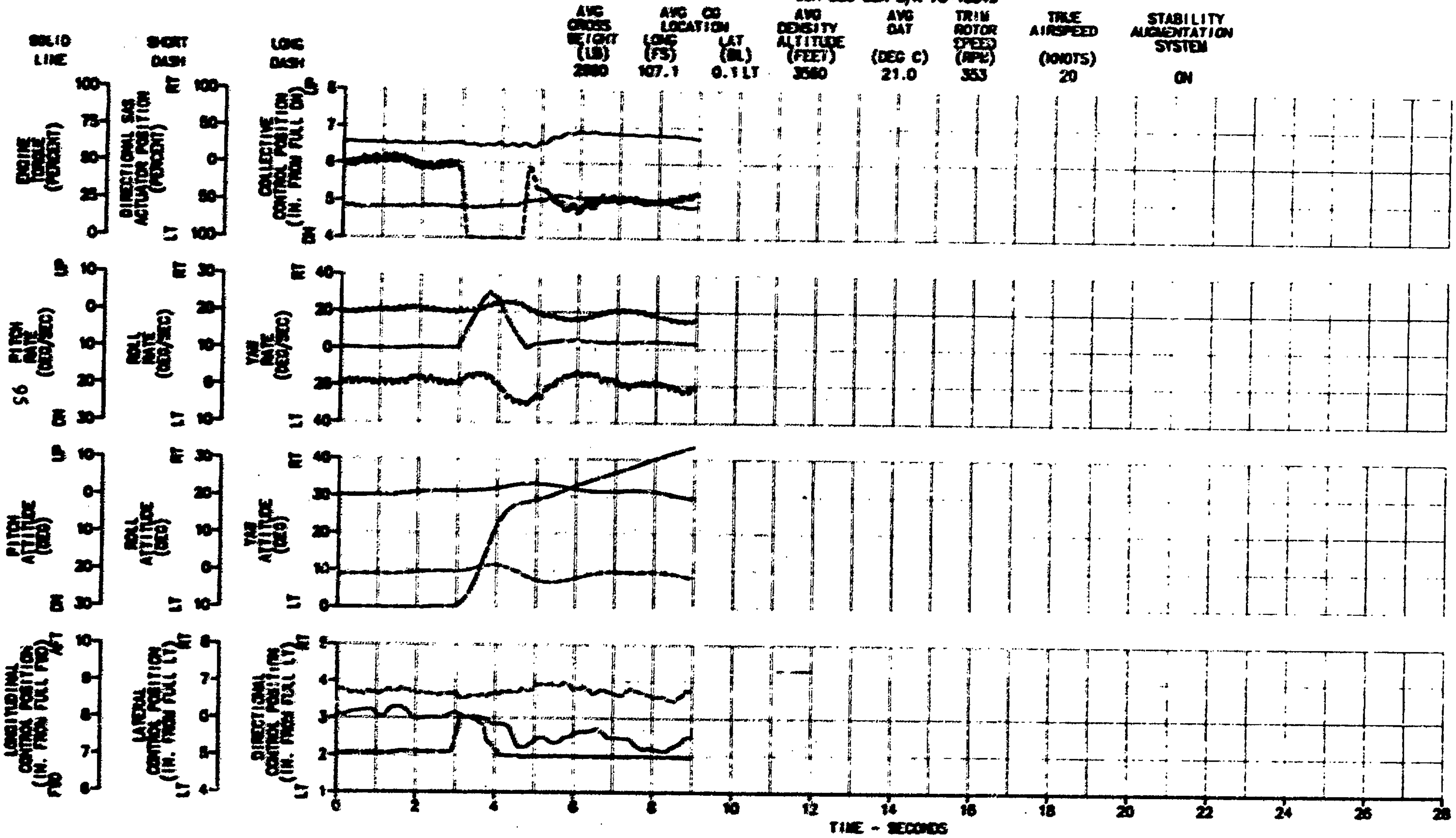


FIGURE E-60
RIGHT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15348

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2830	107.1	0.1 LT	3980	21.0	353	20	OFF

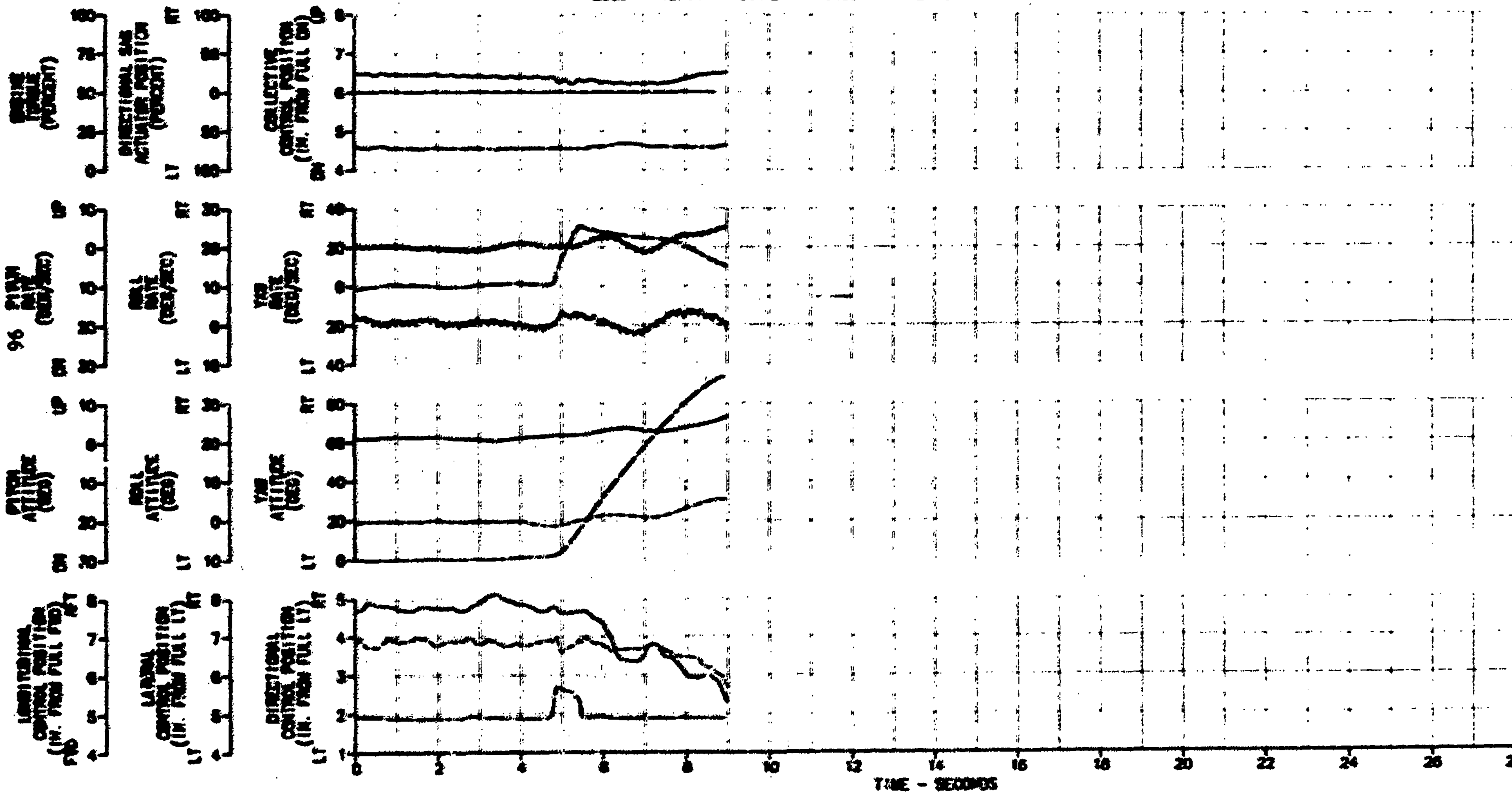


FIGURE I-61
LEFT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15348

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	107.1	0.1 LT	5470	20.5	353	30	ON

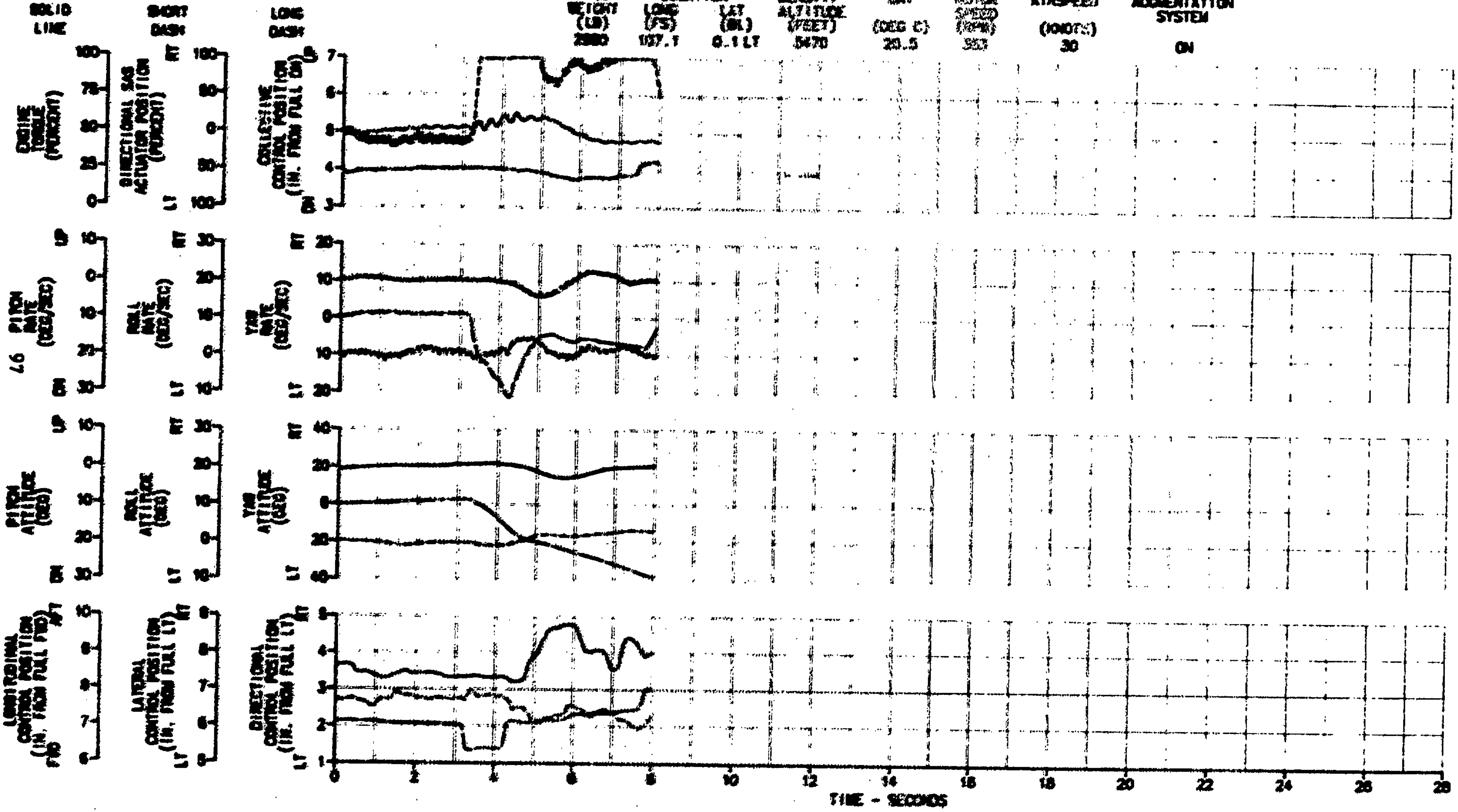


FIGURE E-62
LEFT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2570	107.0	0.1 LT	3500	21.0	353	30	OFF

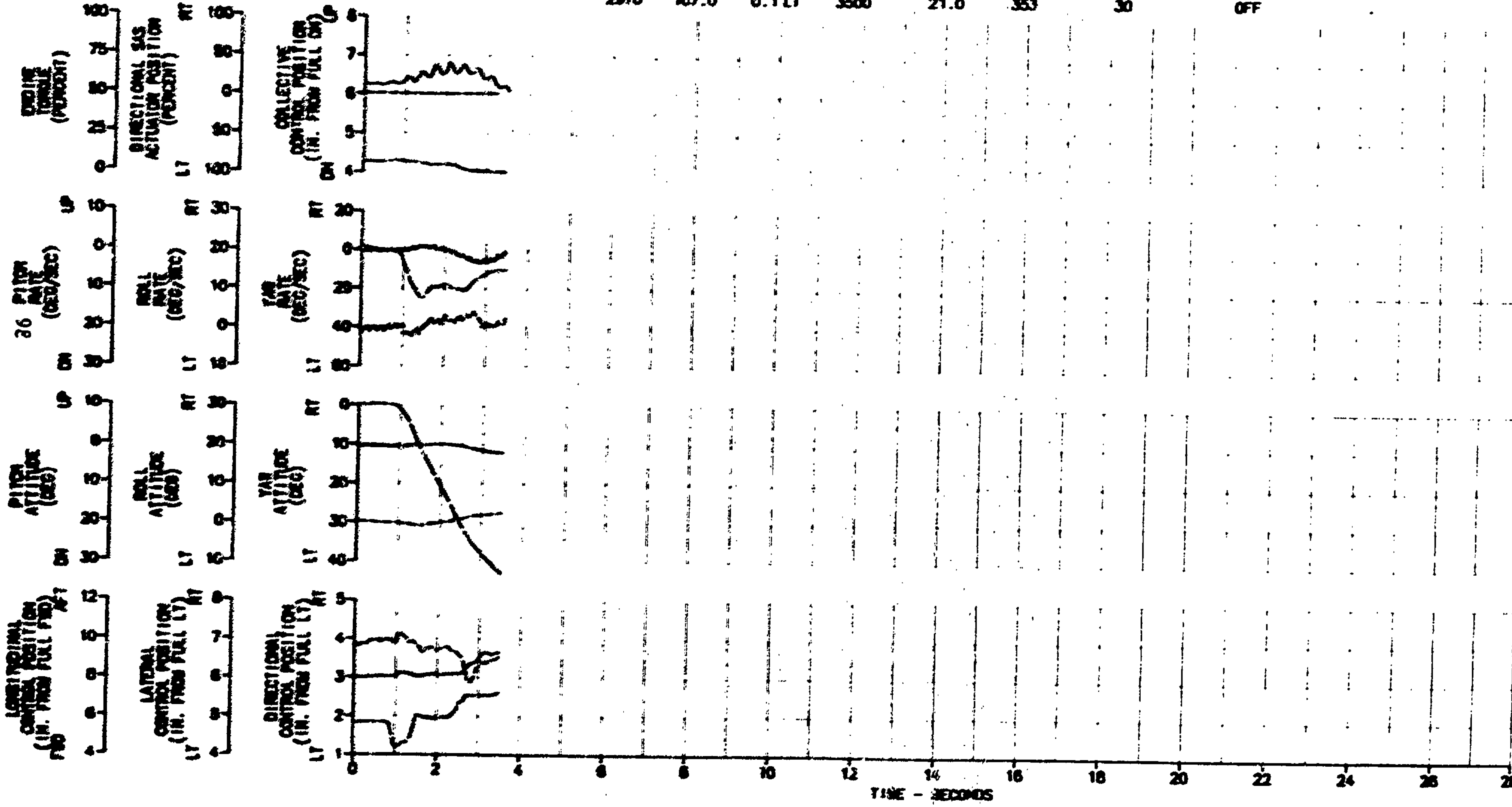


FIGURE E-63

RIGHT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH

JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	107.0	0.1 LT	3540	21.0	352	27	ON

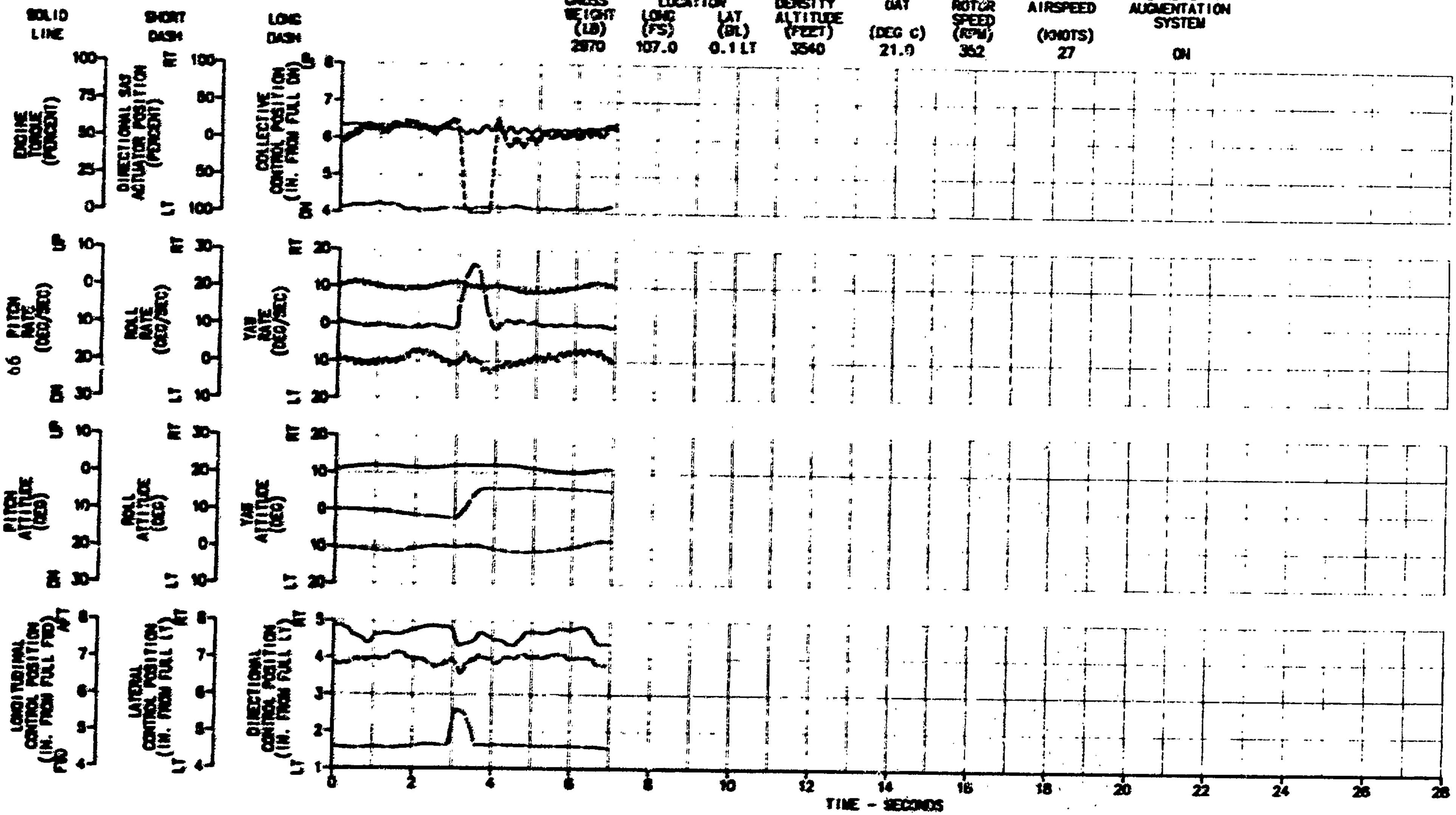


FIGURE E-84

RIGHT DIRECTIONAL PULSE INPUT - 150 DEGREE AZIMUTH

JOH-58C USA S/N 70-15340

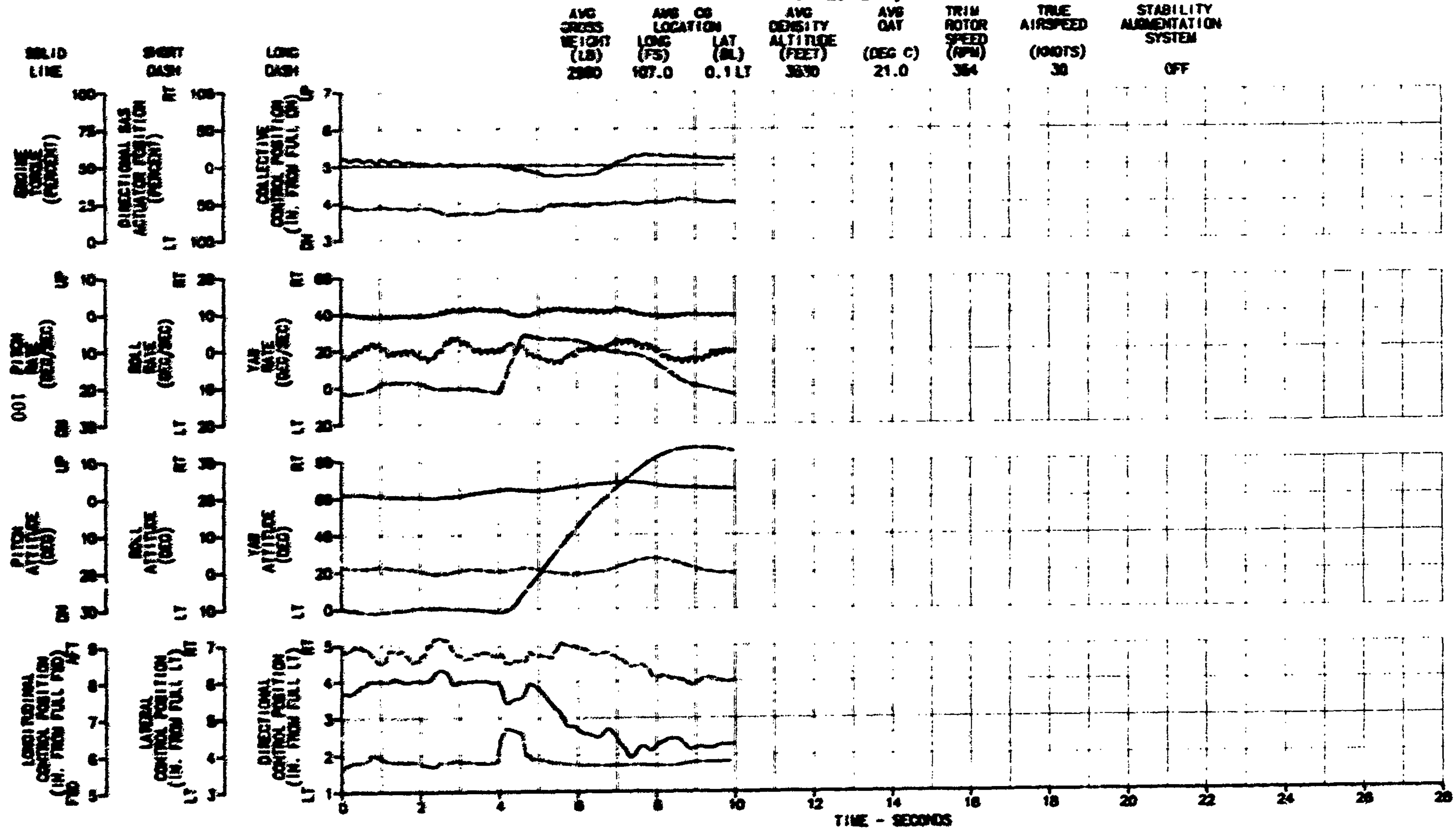


FIGURE E-65
LEFT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	107.0	3.1 LT	3570	21.0	353	0	ON

SOLID LINE — SHORT DASH — LONG DASH

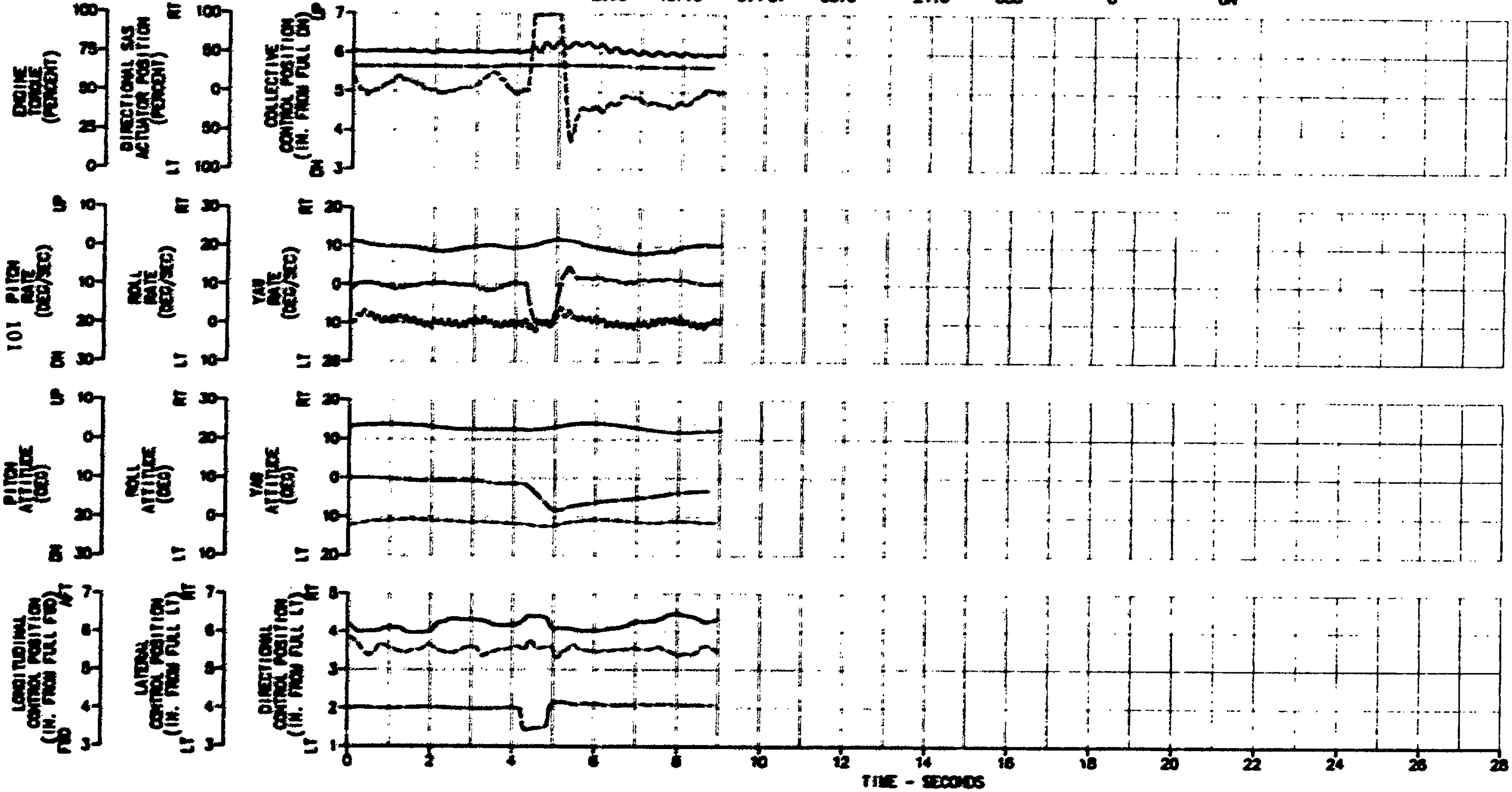


FIGURE E-68
LEFT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

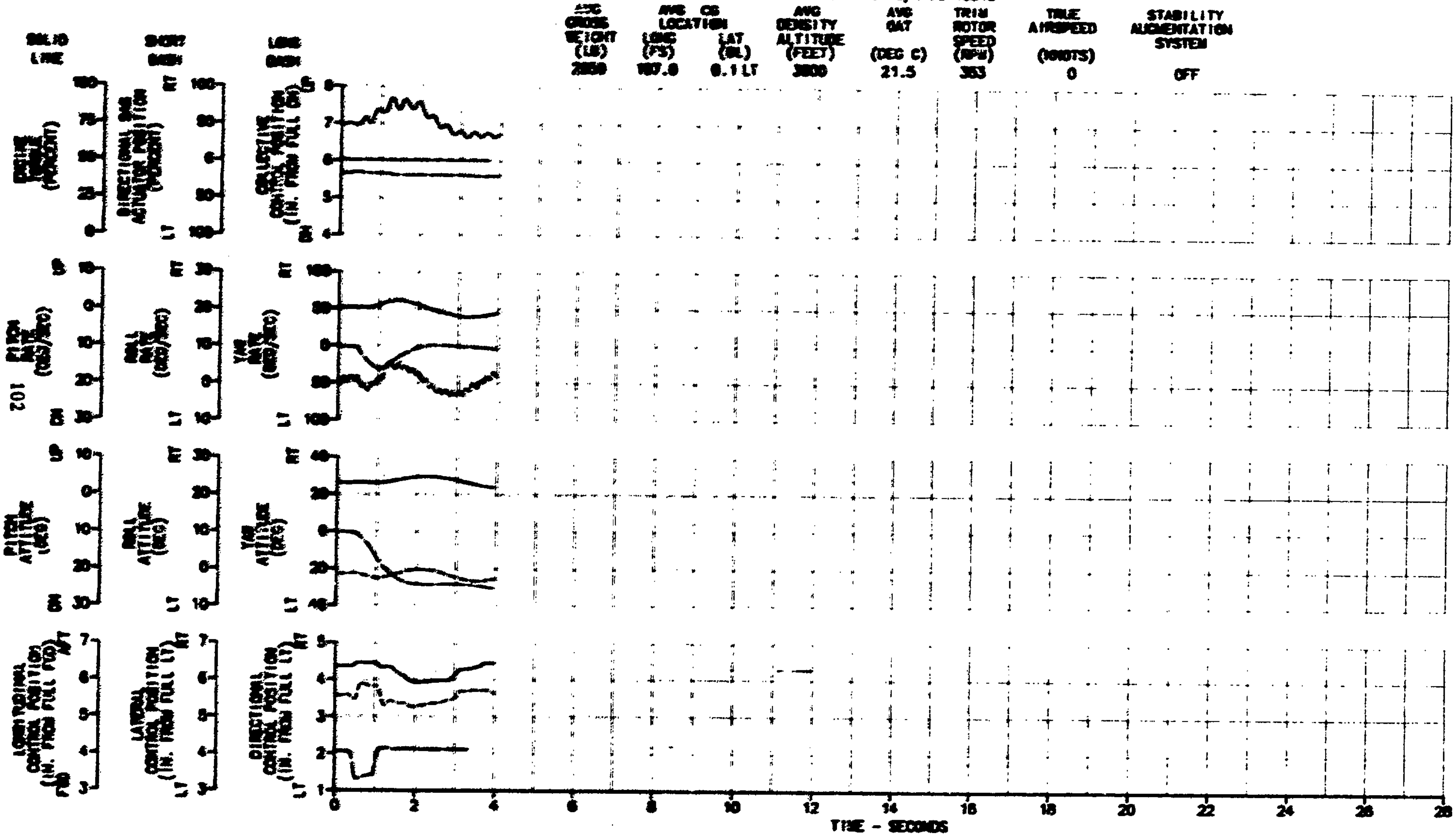


FIGURE E-67
RIGHT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

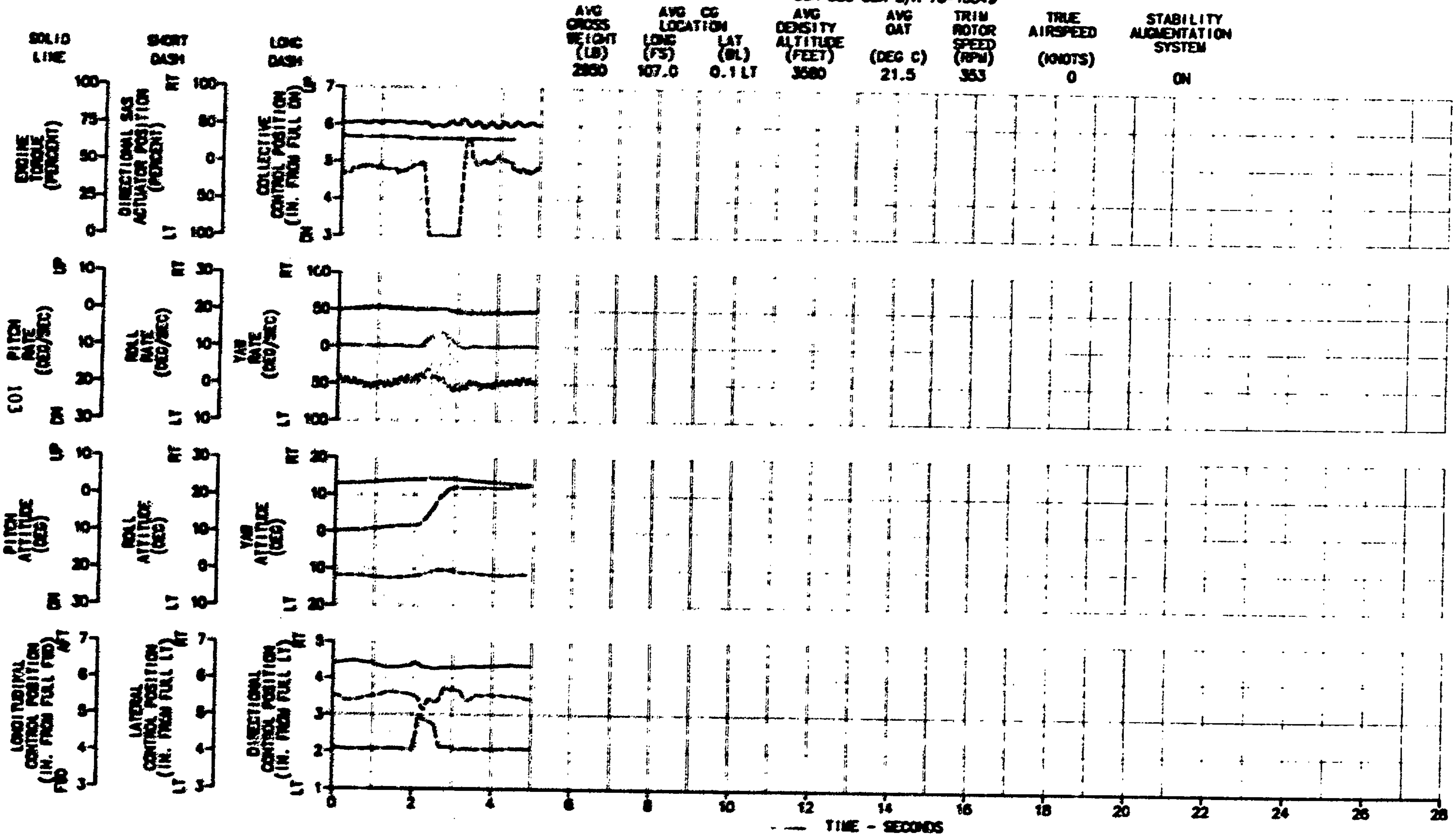


FIGURE E-66
RIGHT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

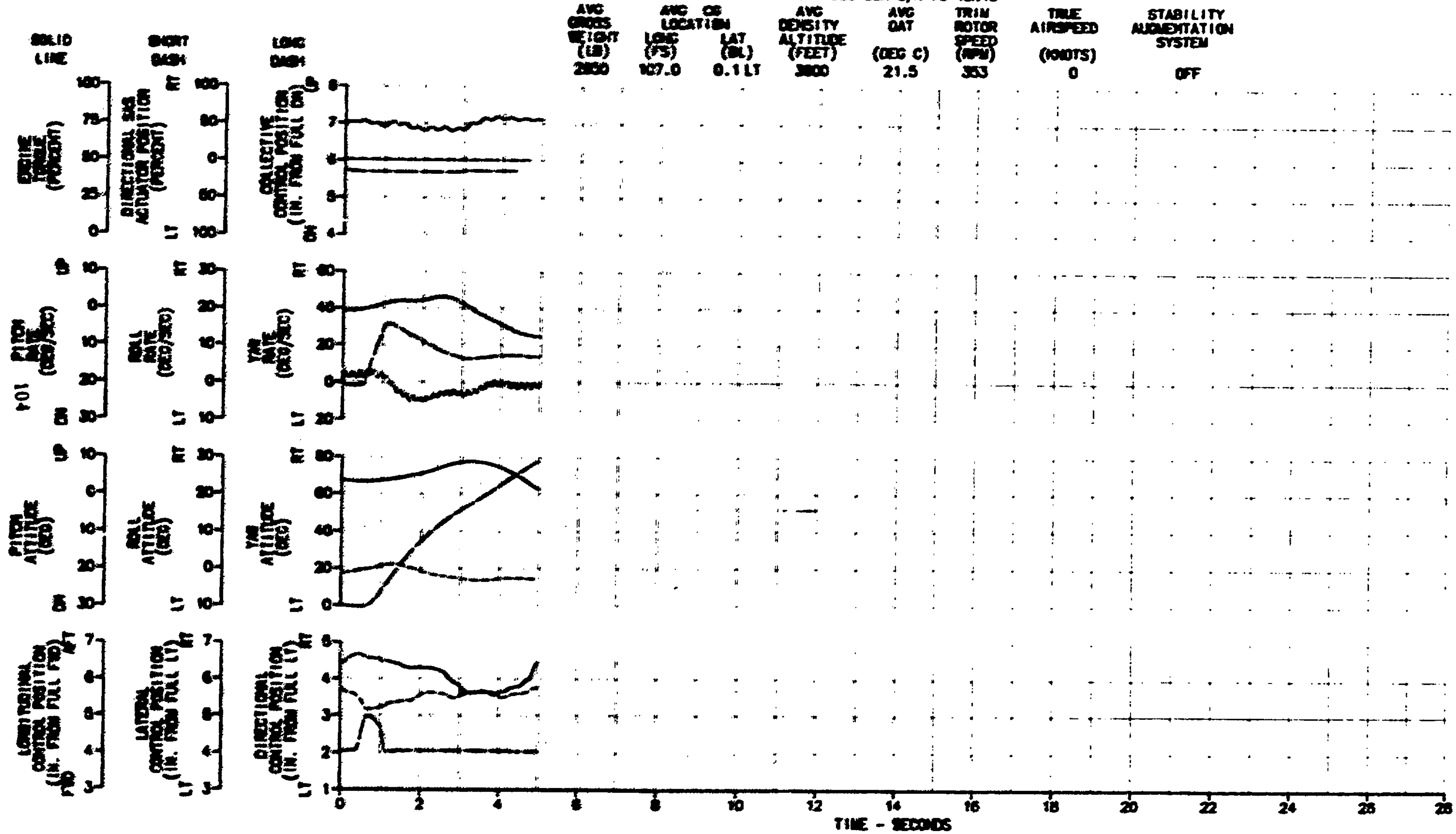


FIGURE E-69
LEFT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15348

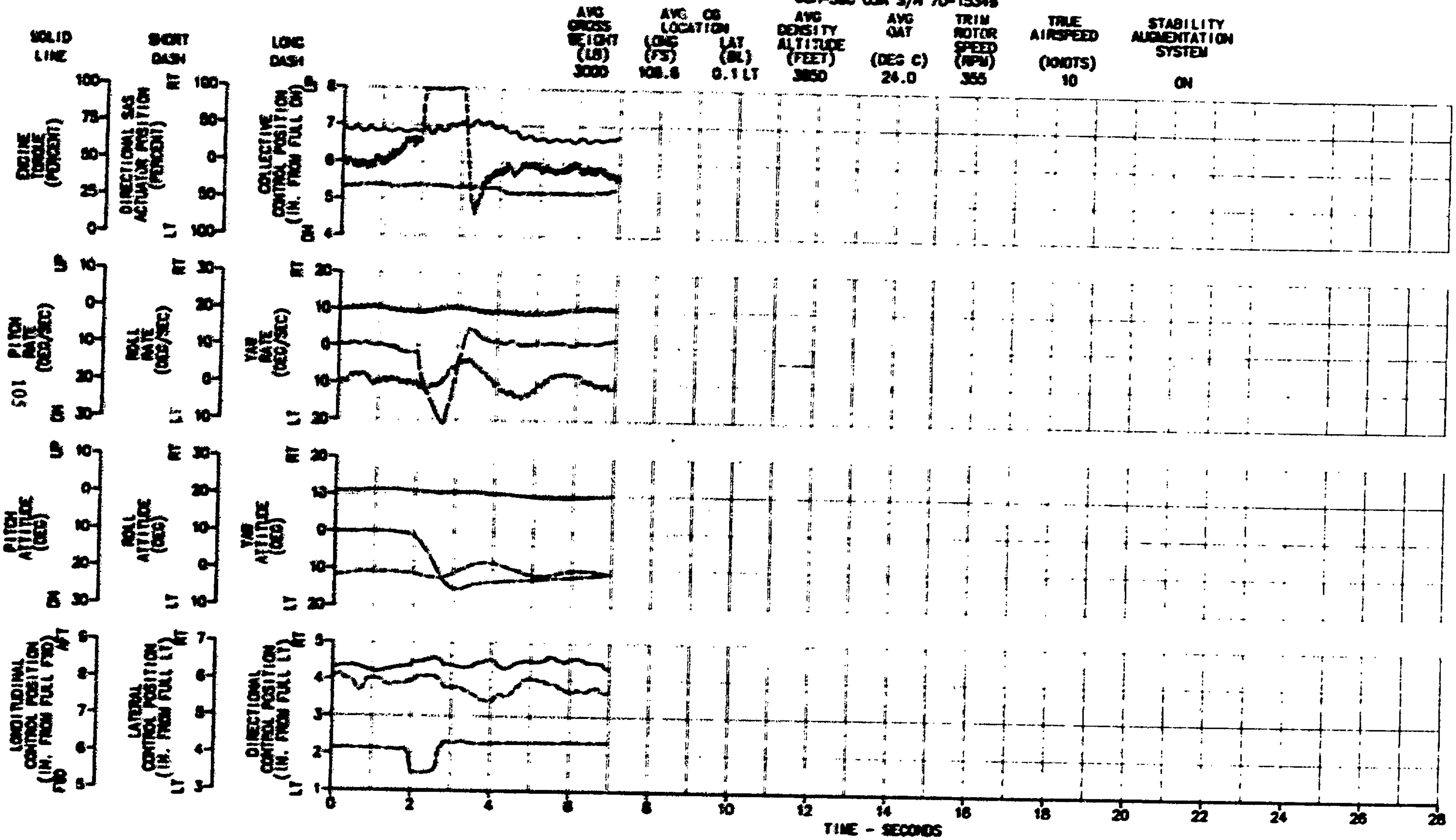


FIGURE E-70

LEFT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH

JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	106.6	0.1 LT	4150	26.5	351	10	OFF

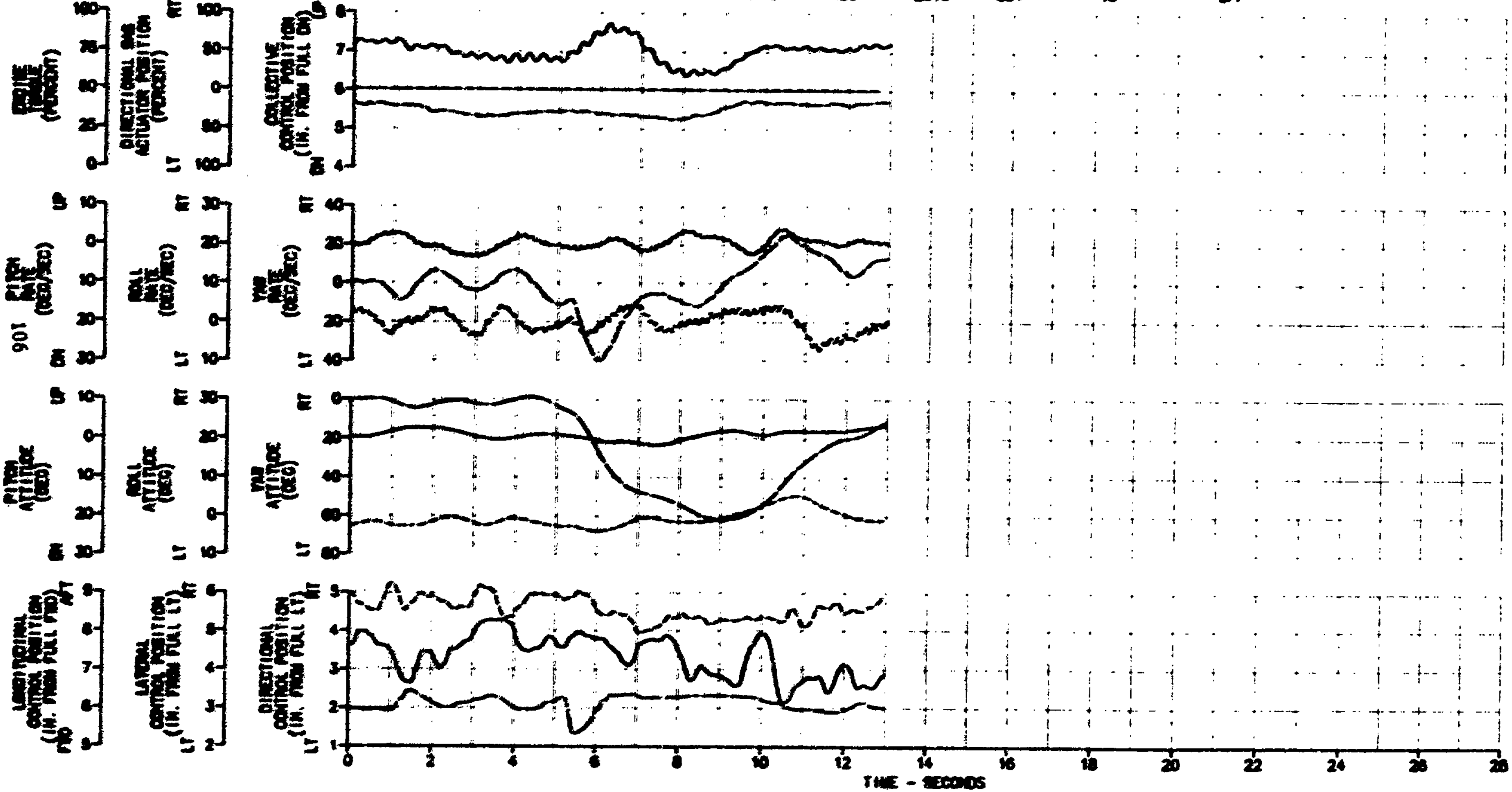


FIGURE E-71
RIGHT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	106.6	0.1 LT	4070	25.5	353	10	ON

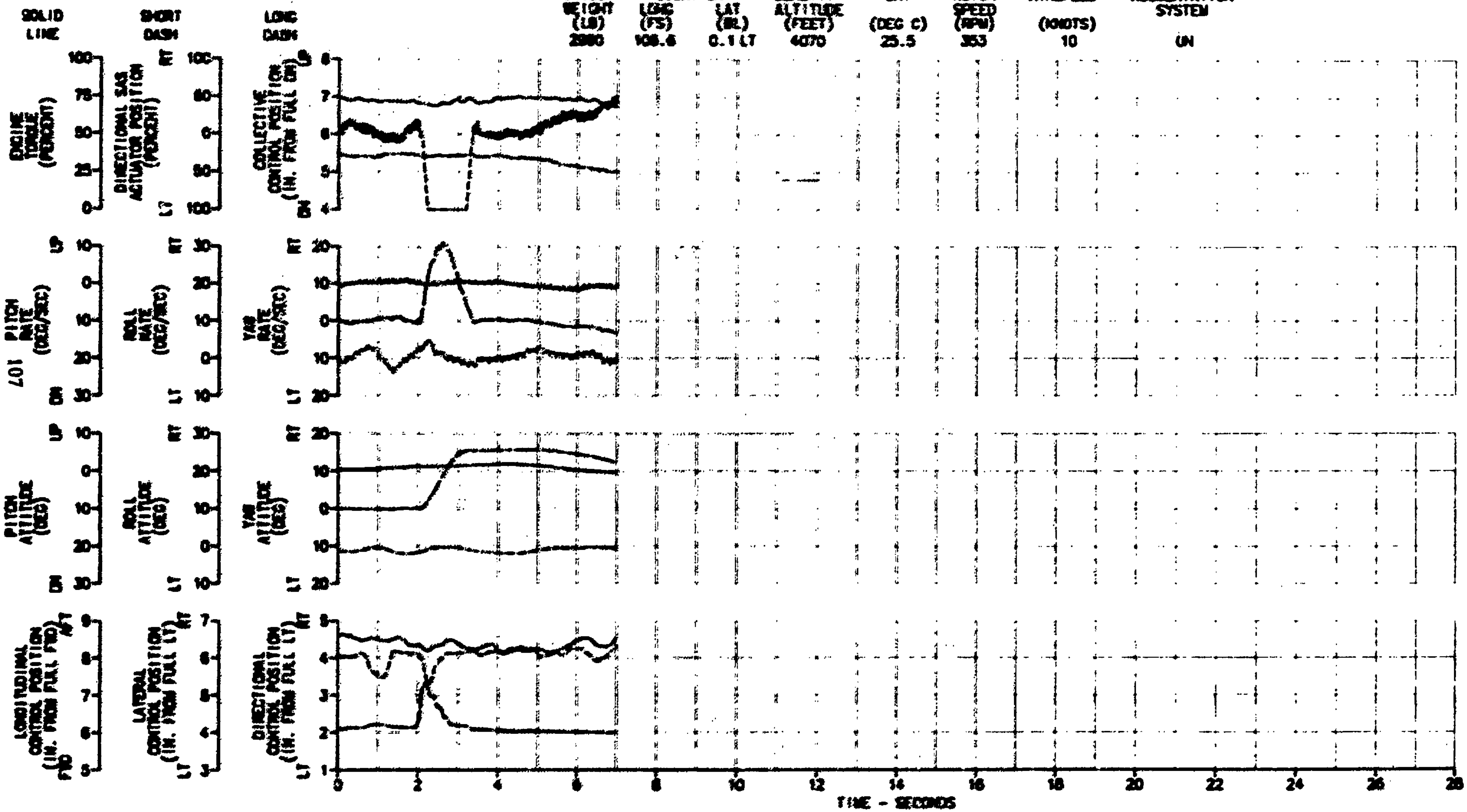


FIGURE E-72
RIGHT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C OH A S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRUE ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
[illegible]	106.6	0.1 LT	4180	27.0	354	10	OFF

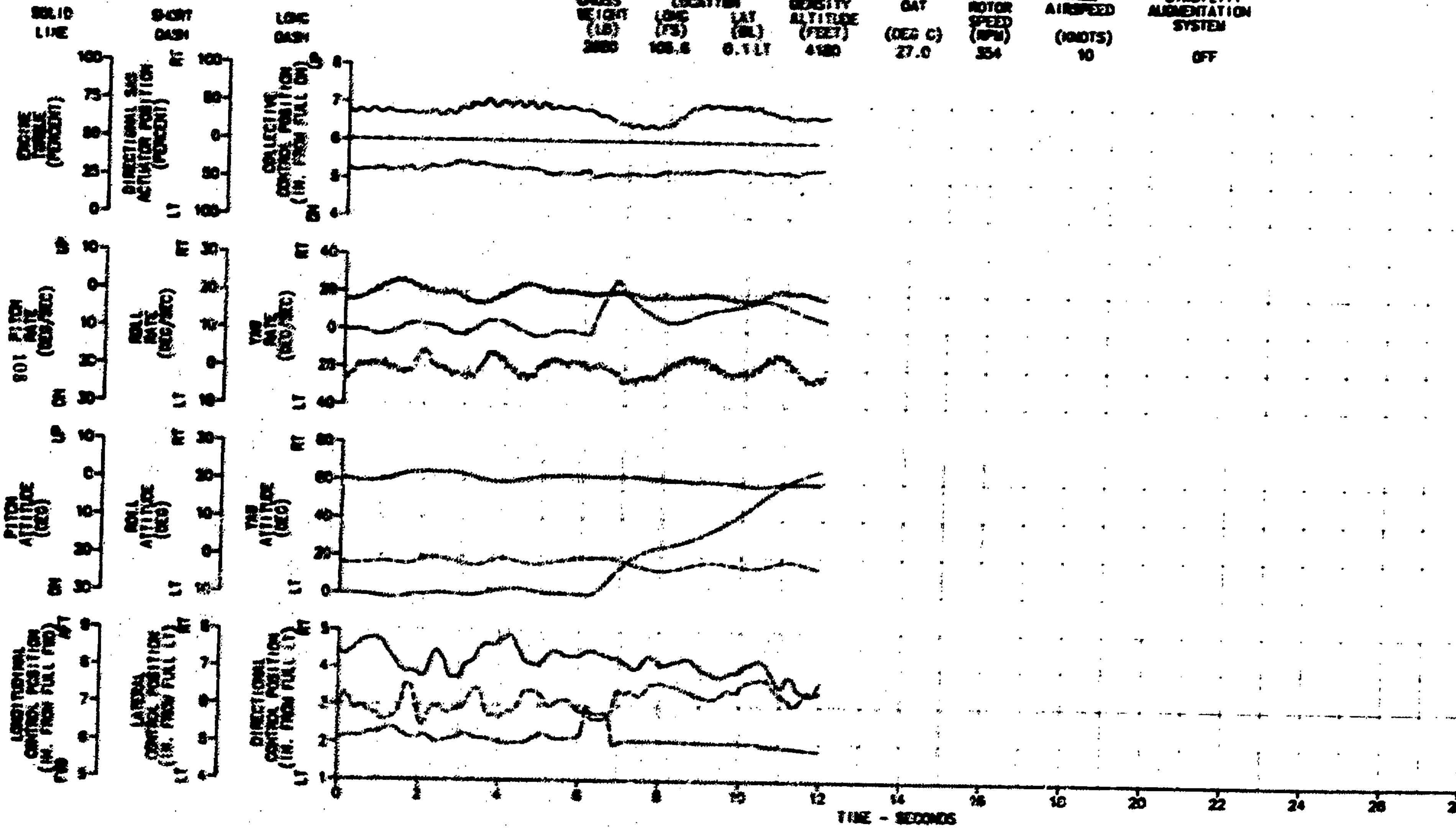


FIGURE C-73
LEFT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (IN.)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2580	106.6	0.1 LT	4020	25.5	352	20	ON

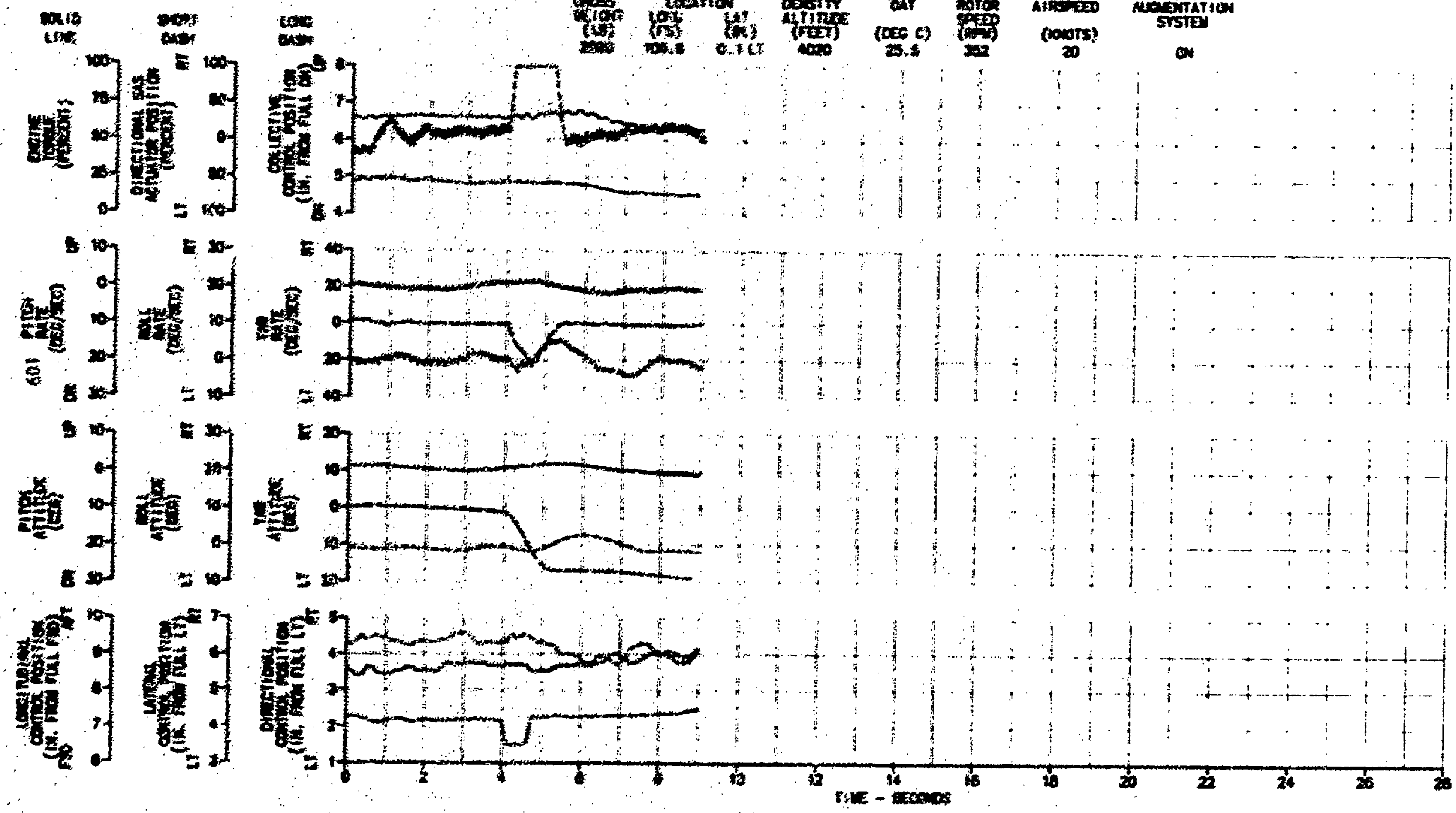


FIGURE E-74
LEFT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	106.6	-0.1 LT	3750	23.0	354	20	OFF

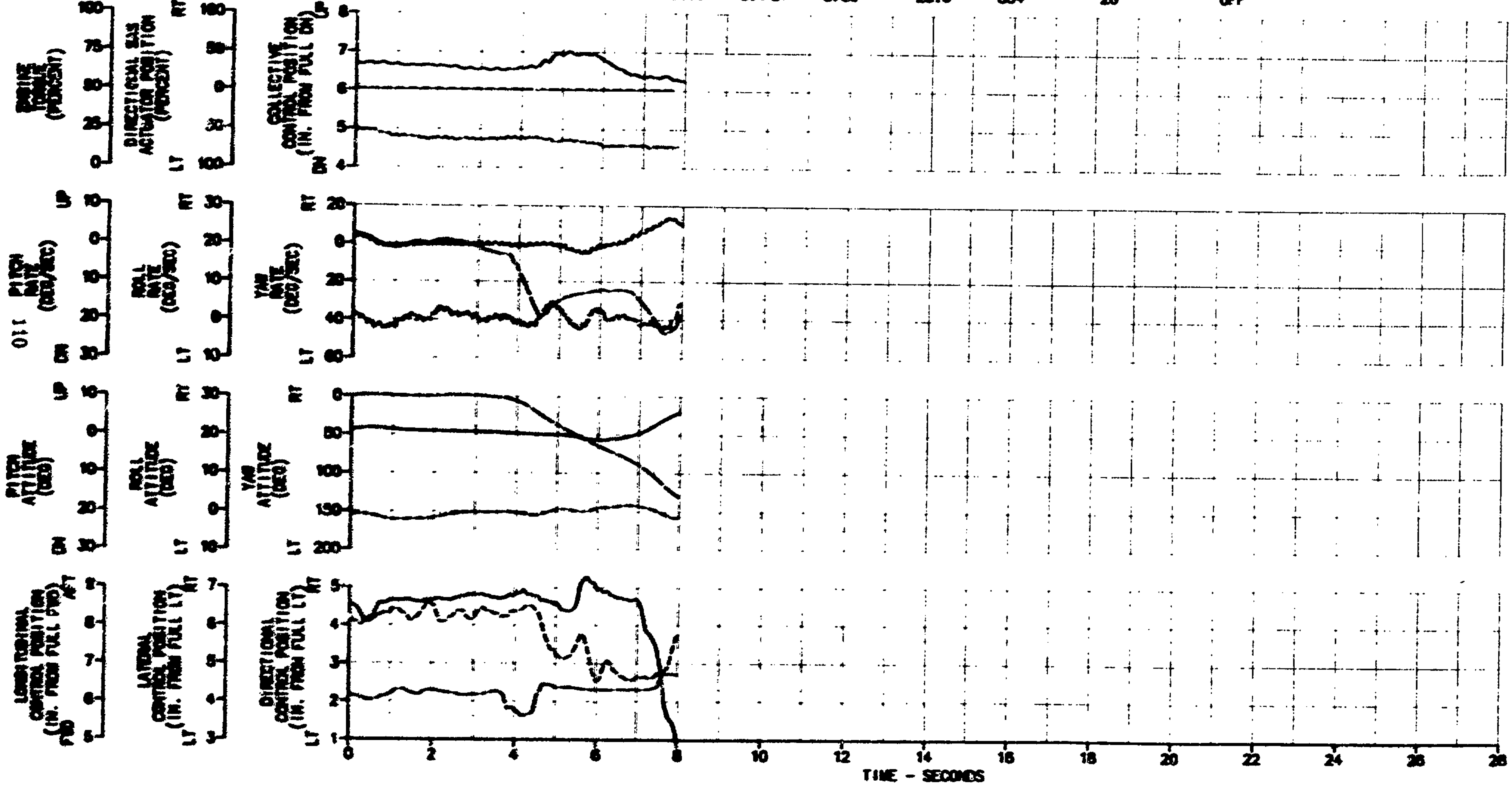


FIGURE E-75
RIGHT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.6	0.1 LT	3040	25.0	354	20	ON

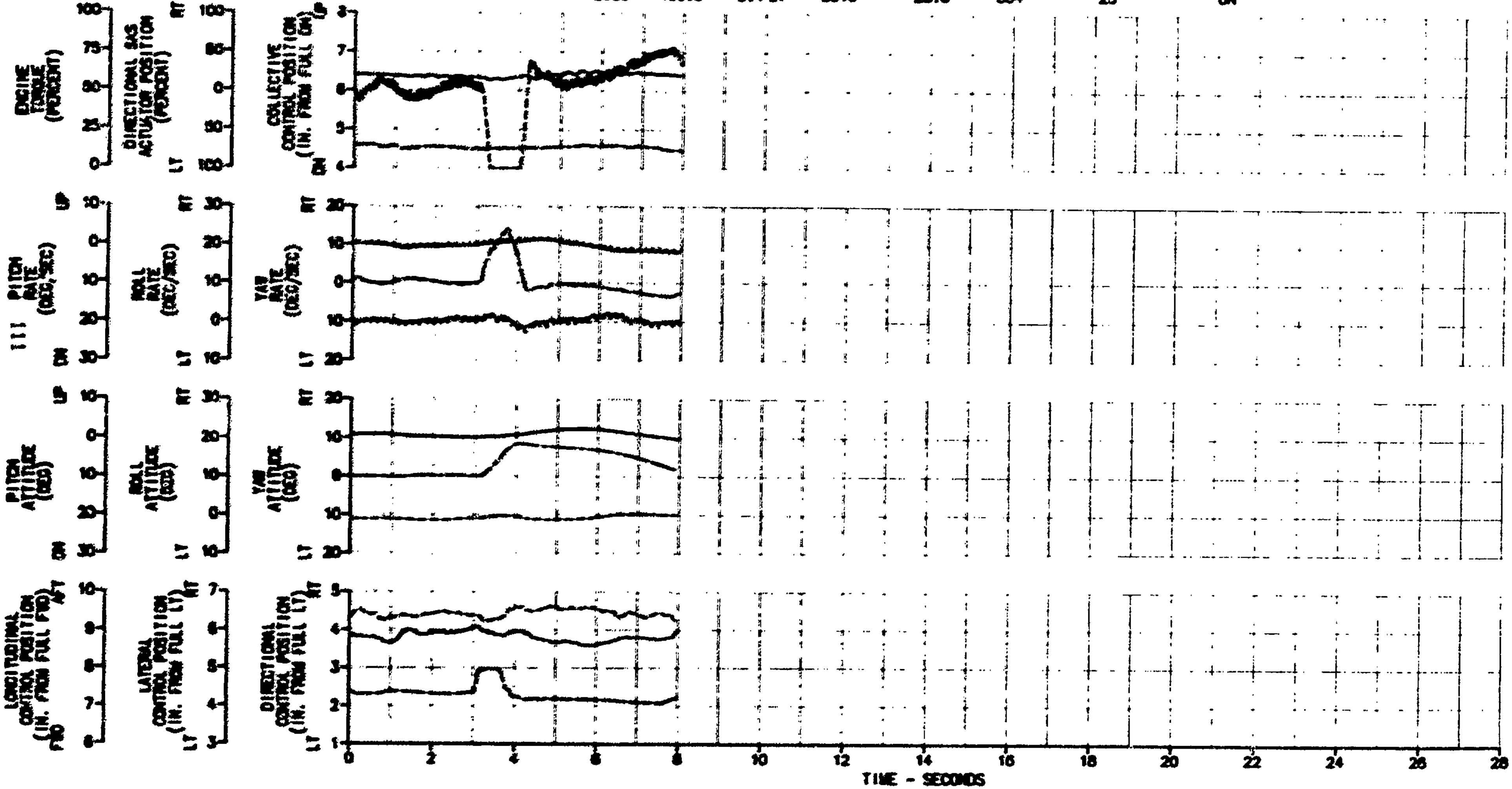


FIGURE E-76
RIGHT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	106.6	0.1 LT	3670	22.5	353	20	OFF

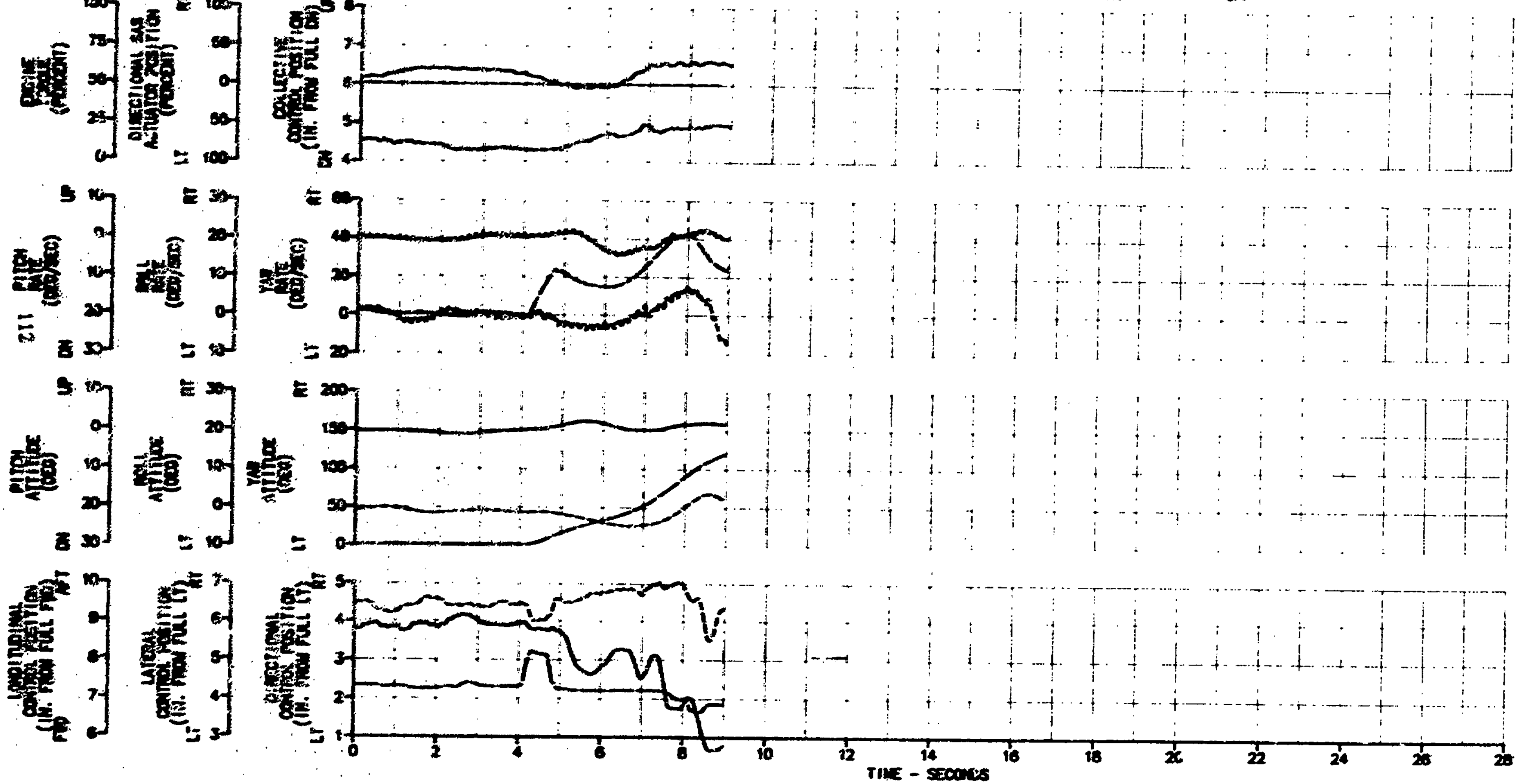


FIGURE E-77
LEFT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 71-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	106.5	0.1 LT	3550	21.5	356	30	ON

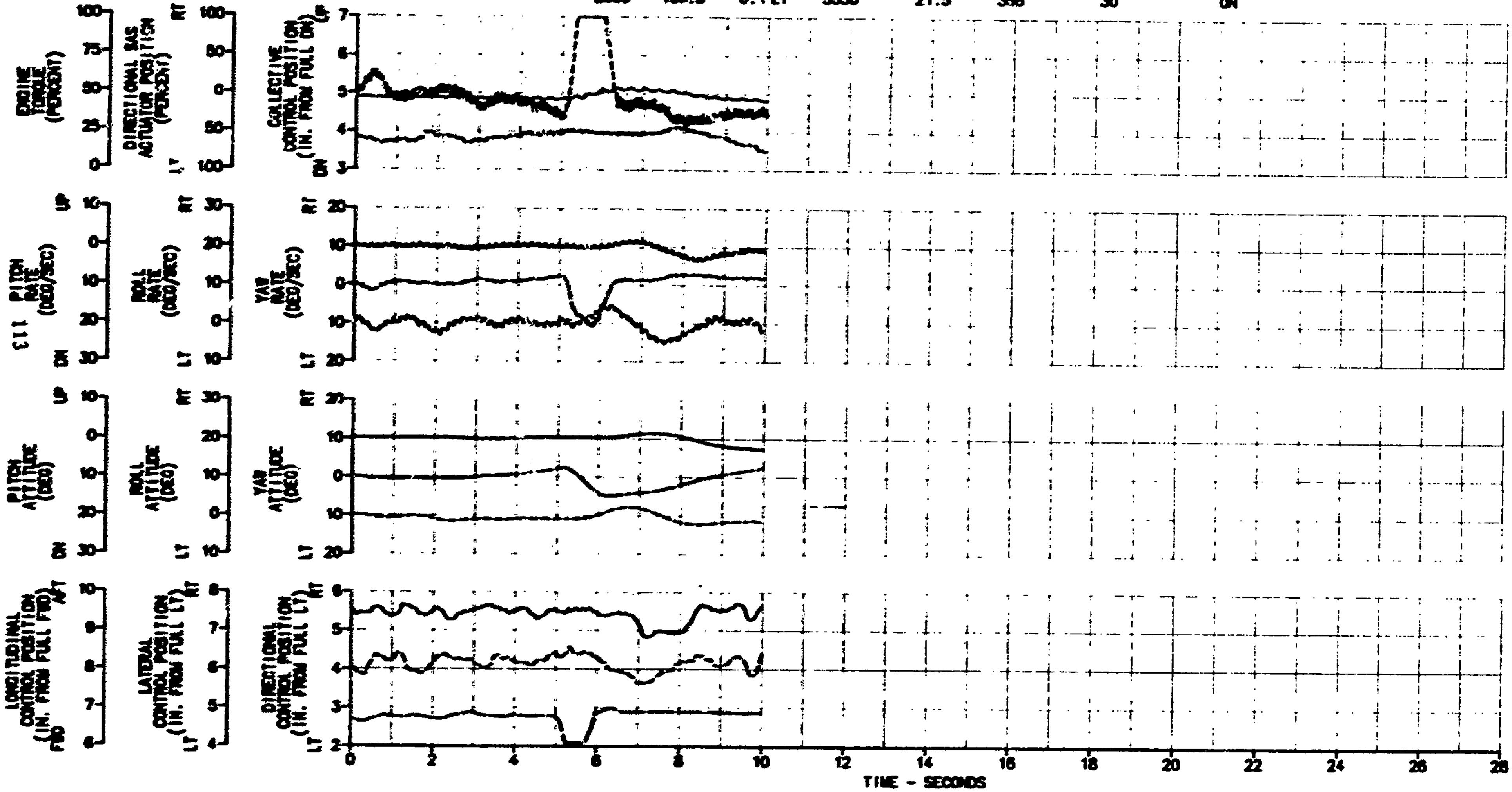


FIGURE E-78
LEFT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

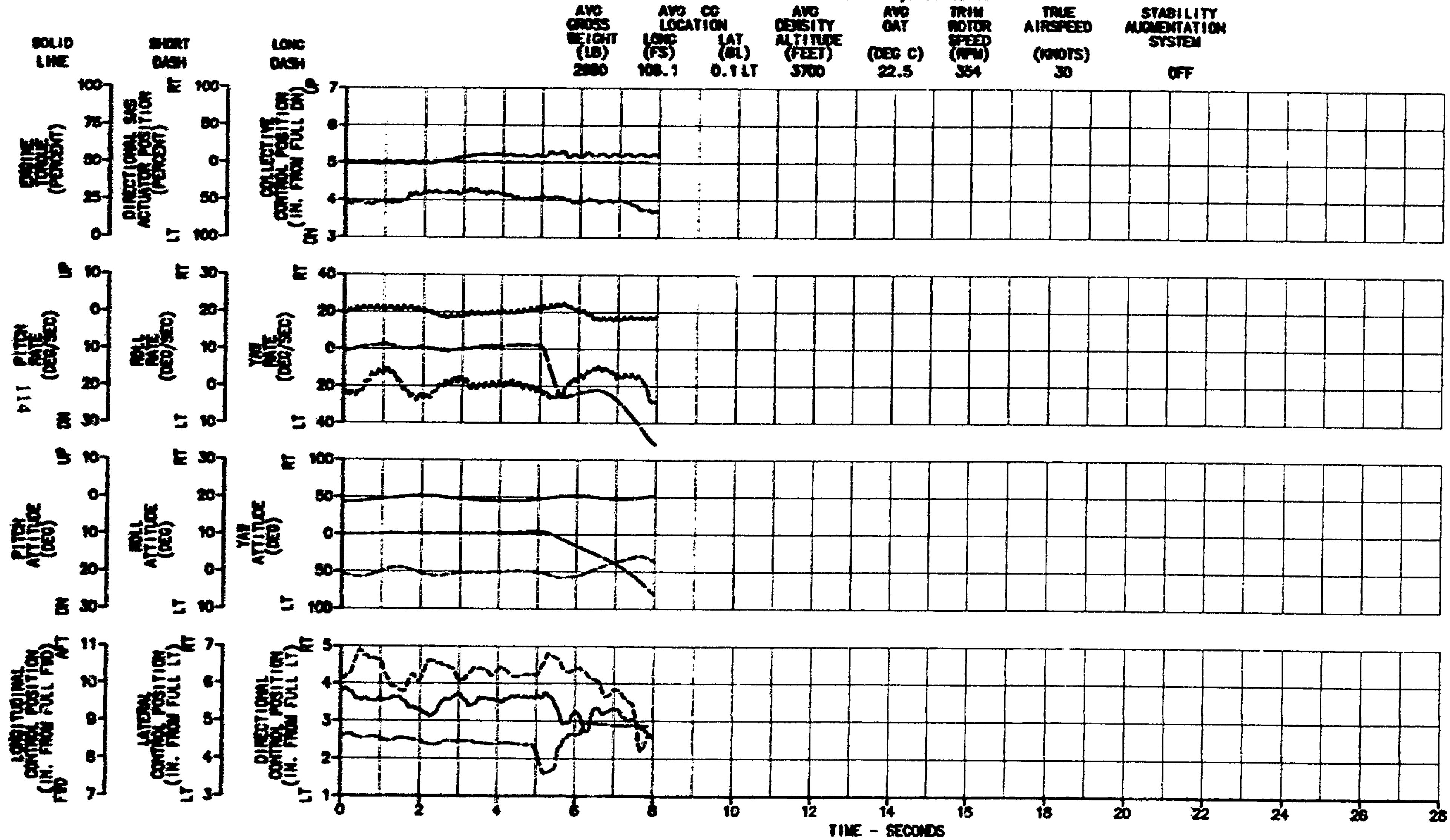


FIGURE E-79
RIGHT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

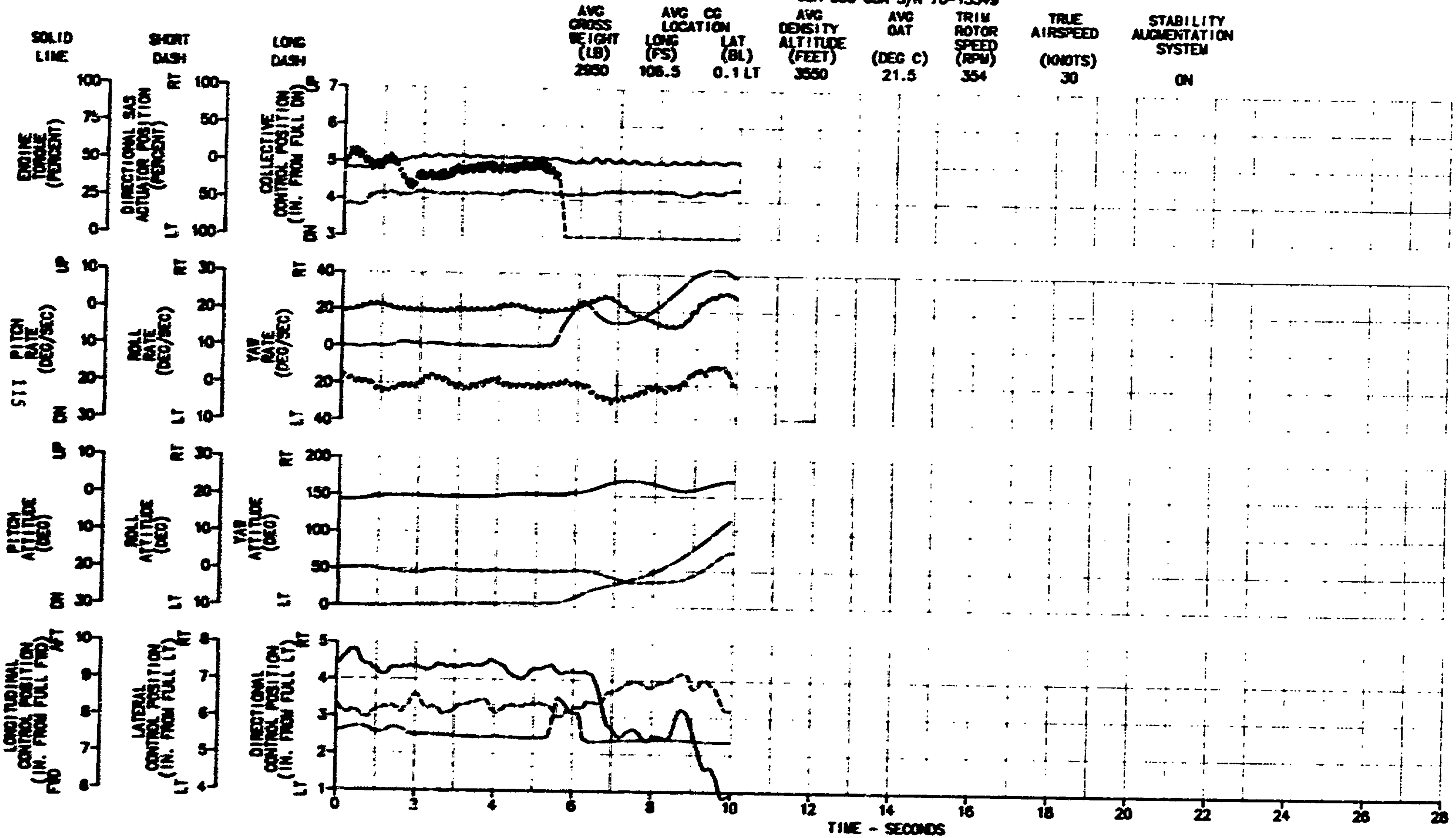


FIGURE E-80
RIGHT DIRECTIONAL PULSE INPUT - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	106.1	0.1 LT	3820	22.0	355	30	OFF

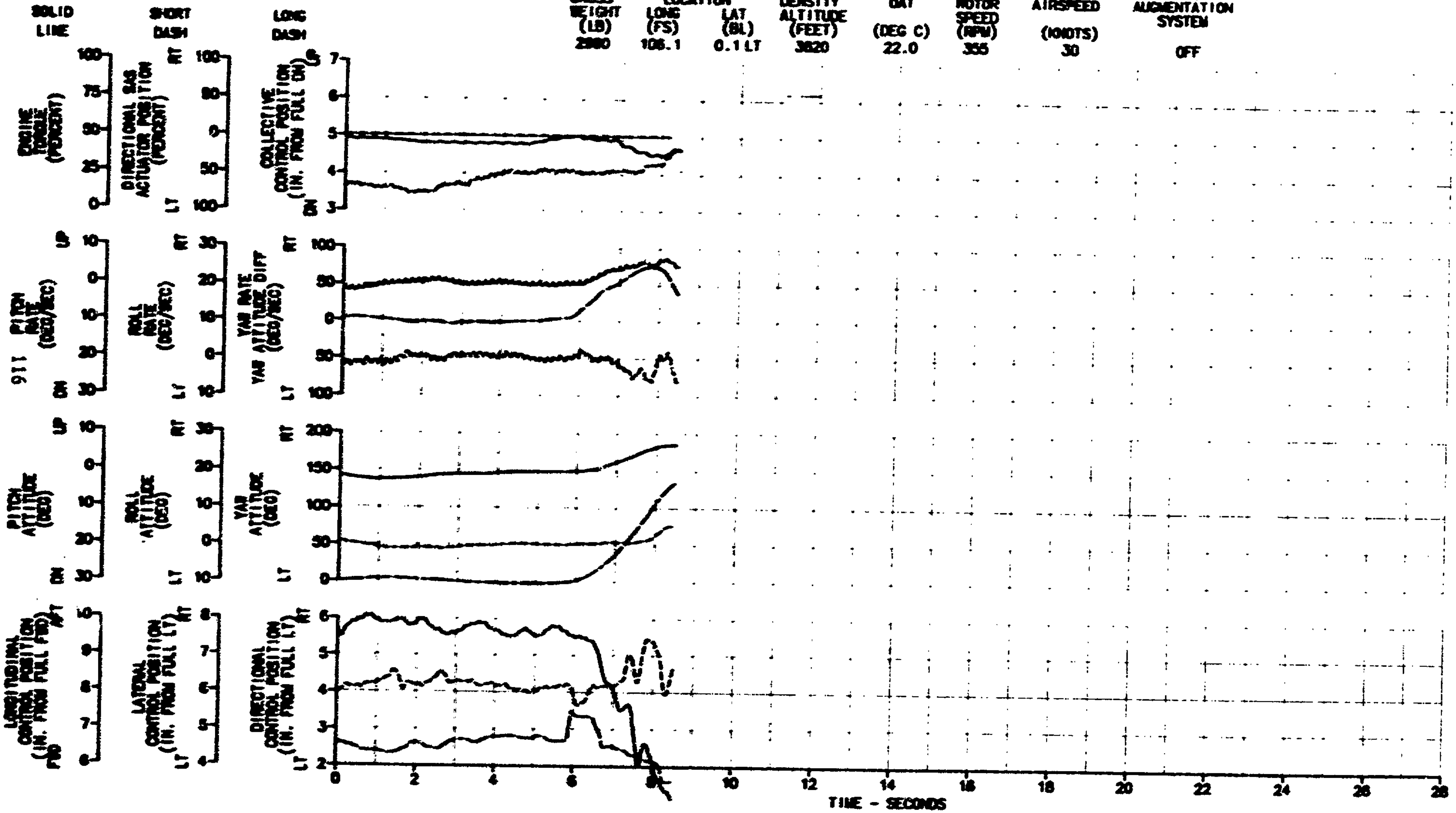


FIGURE E-61
LEFT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	107.5	0.1 LT	4270	27.5	353	0	ON

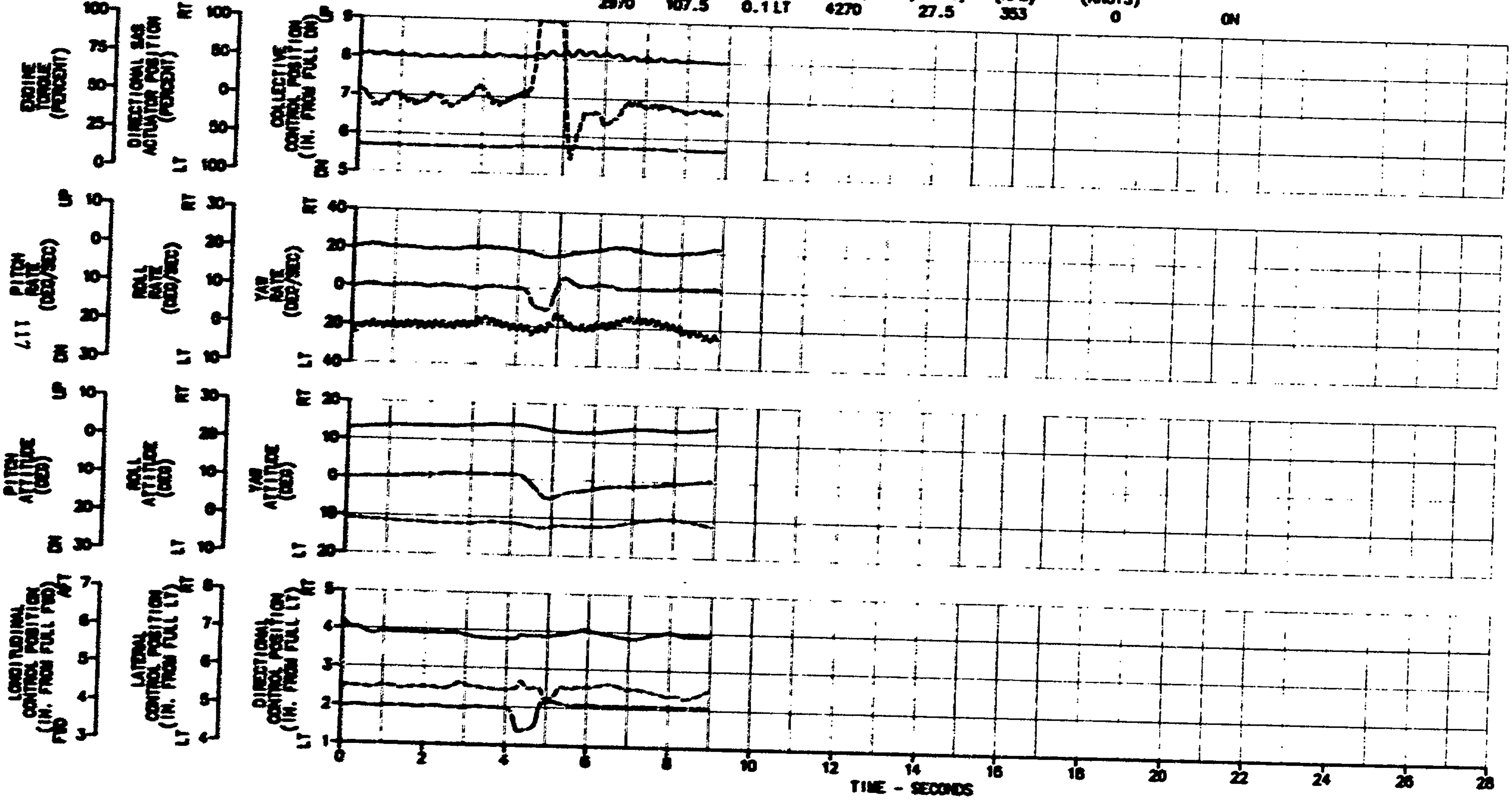


FIGURE E-82
LEFT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	107.5	0.1 LT	4300	28.0	353	0	OFF

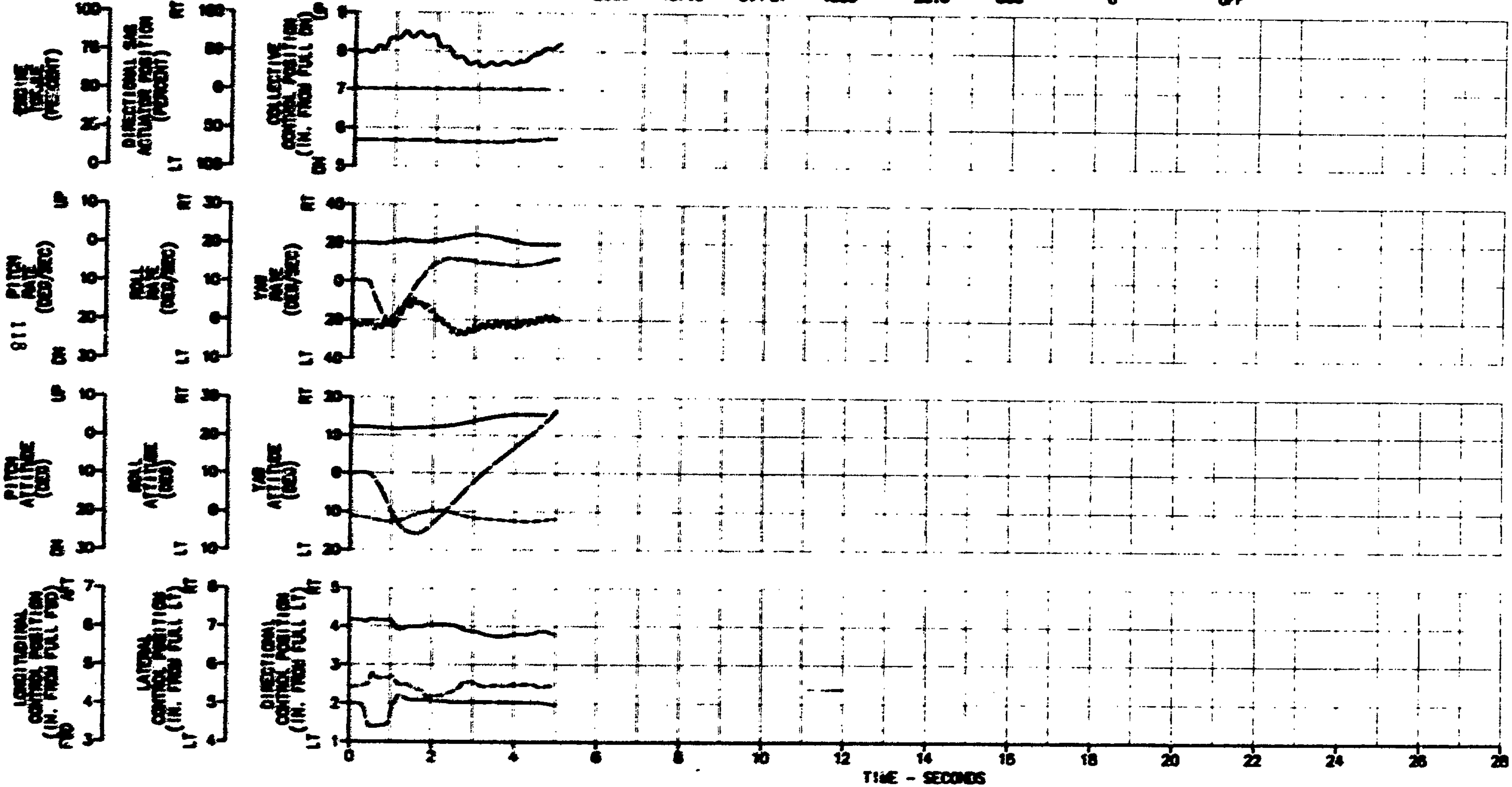


FIGURE E-83
RIGHT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

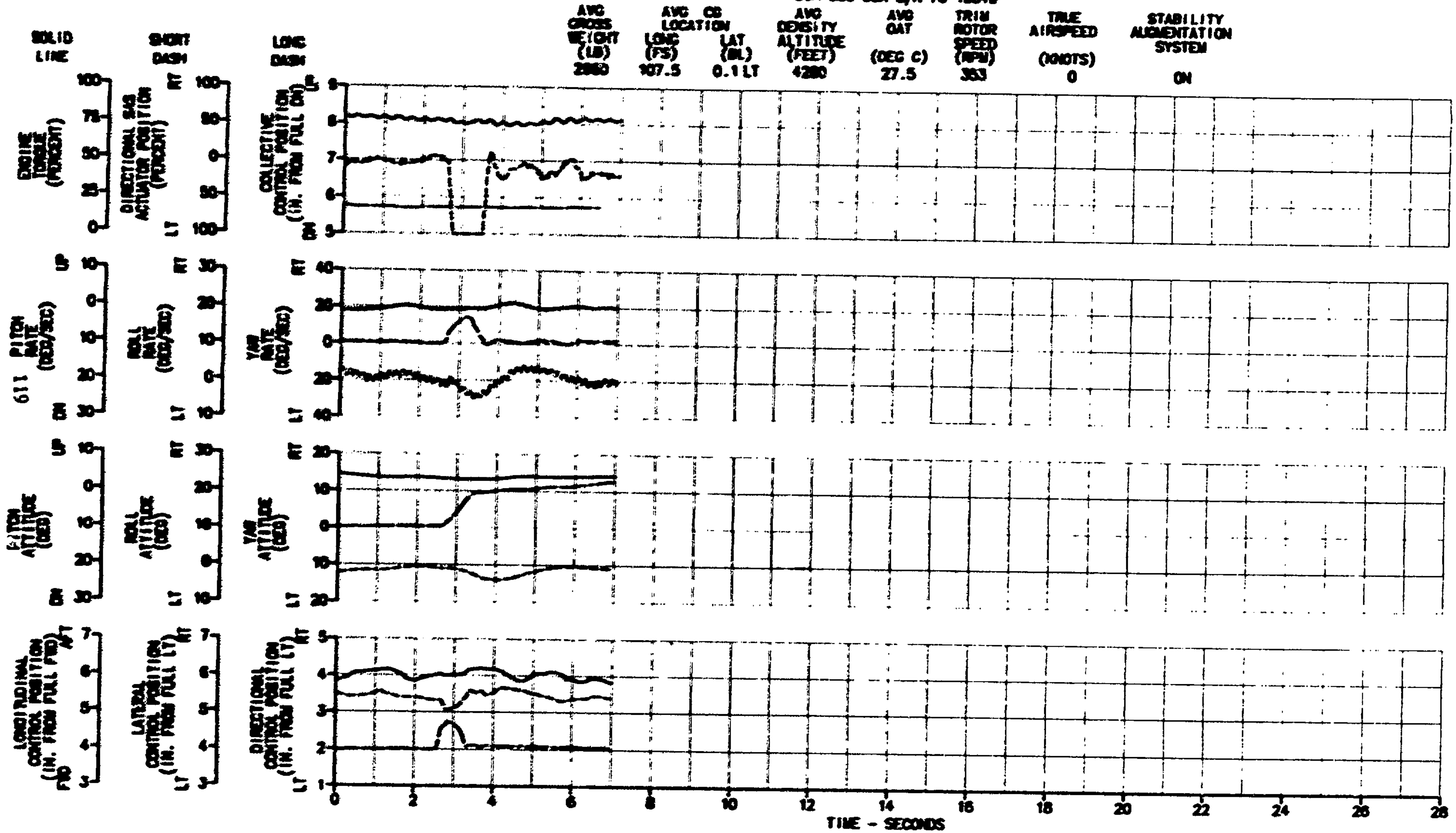


FIGURE E-84
RIGHT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	107.5	0.1 LT	4280	28.0	352	0	OFF

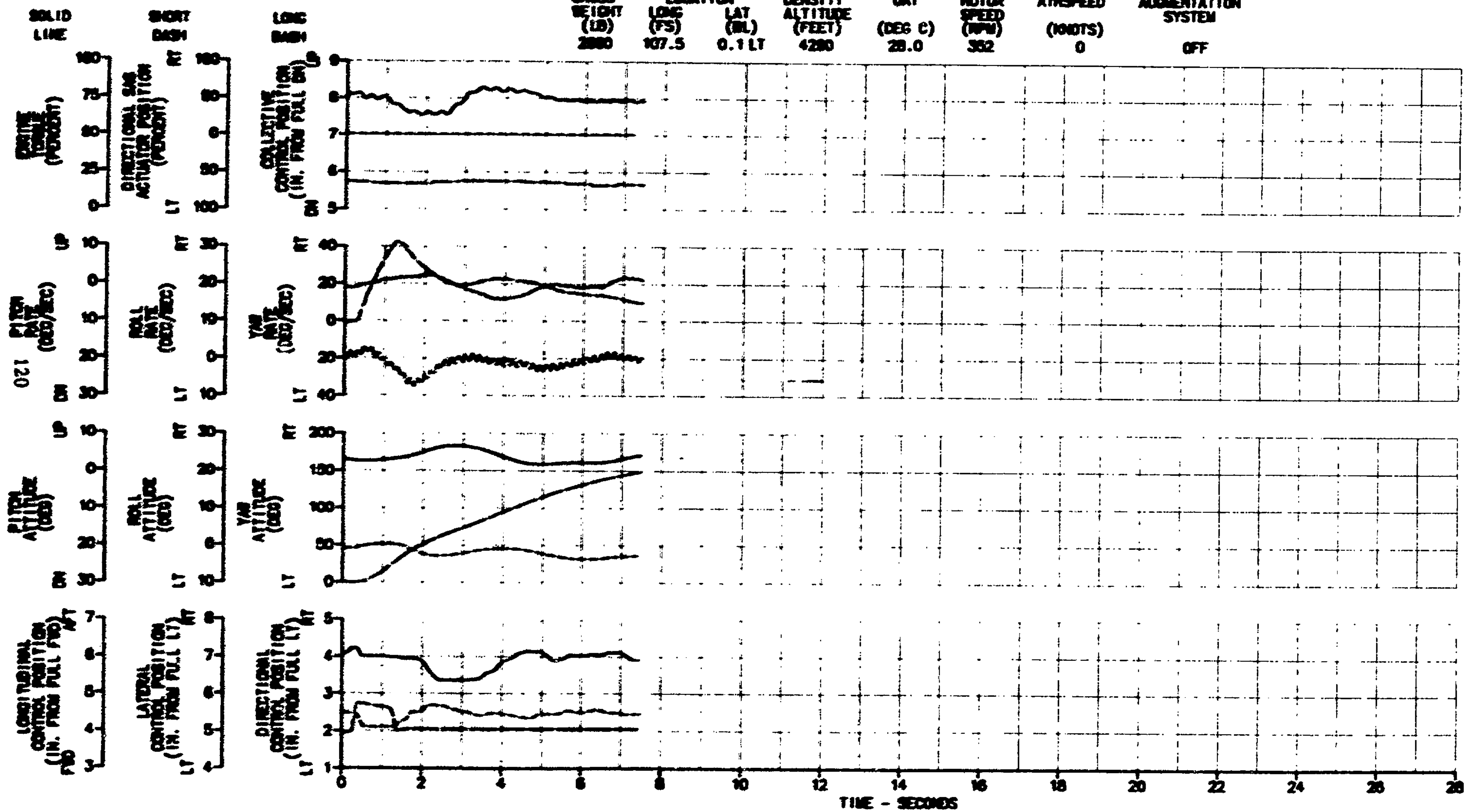


FIGURE E-85
LEFT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

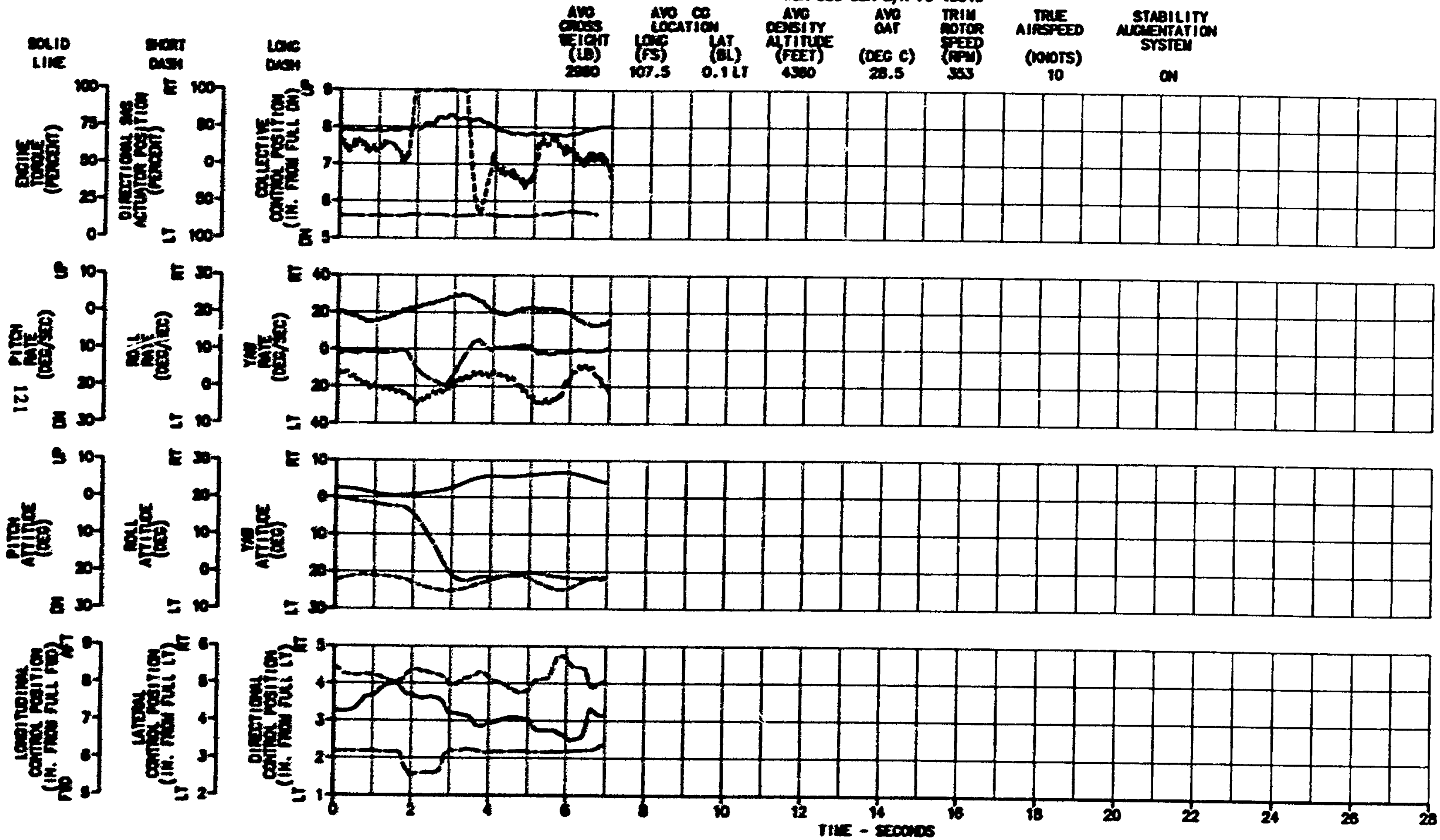


FIGURE E-86
LEFT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2800	107.5	0.1 LT	4450	20.0	353	10	OFF

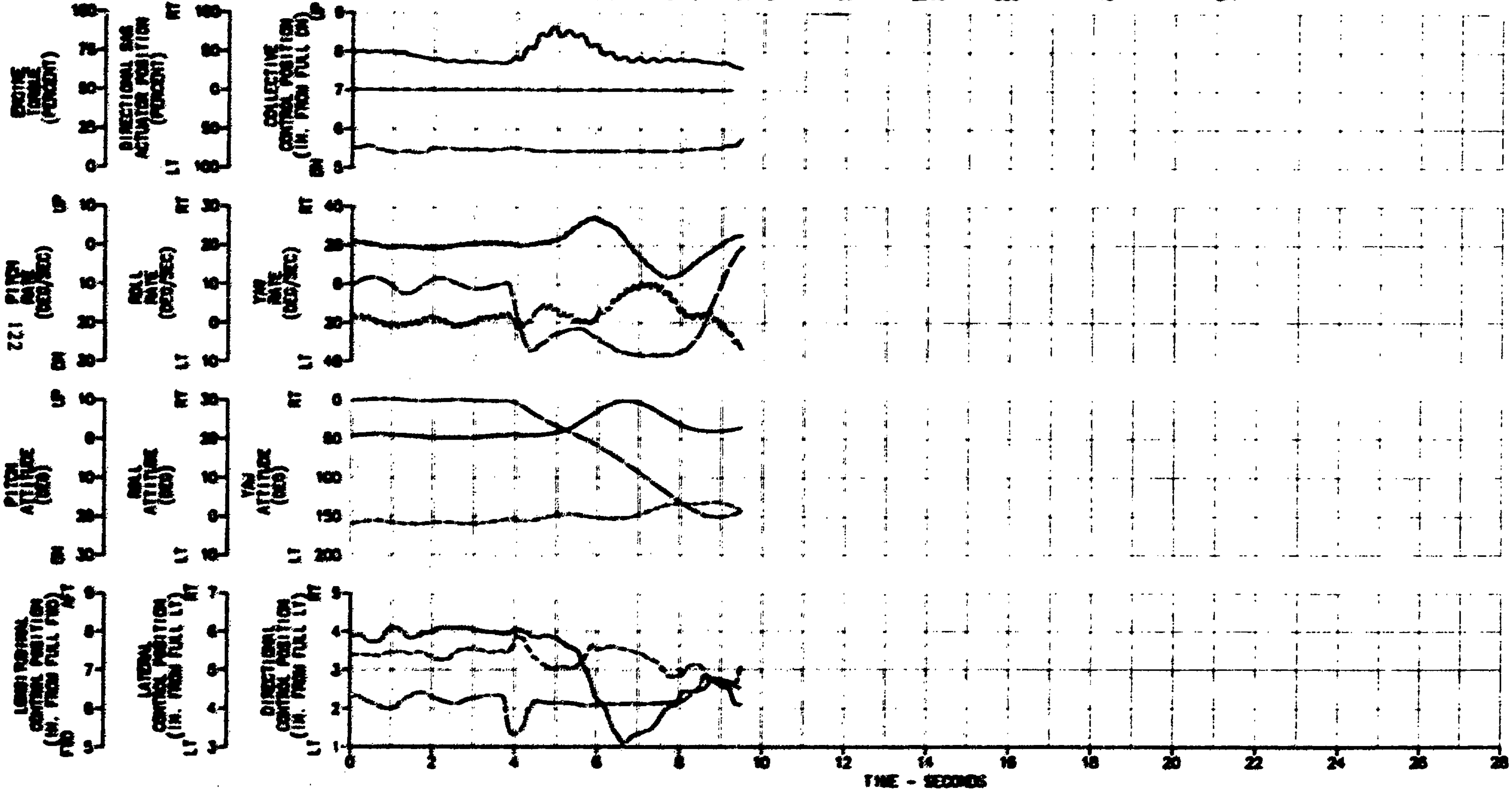


FIGURE E-87
RIGHT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2850	107.5	0.1 LT	4380	28.5	356	10	ON

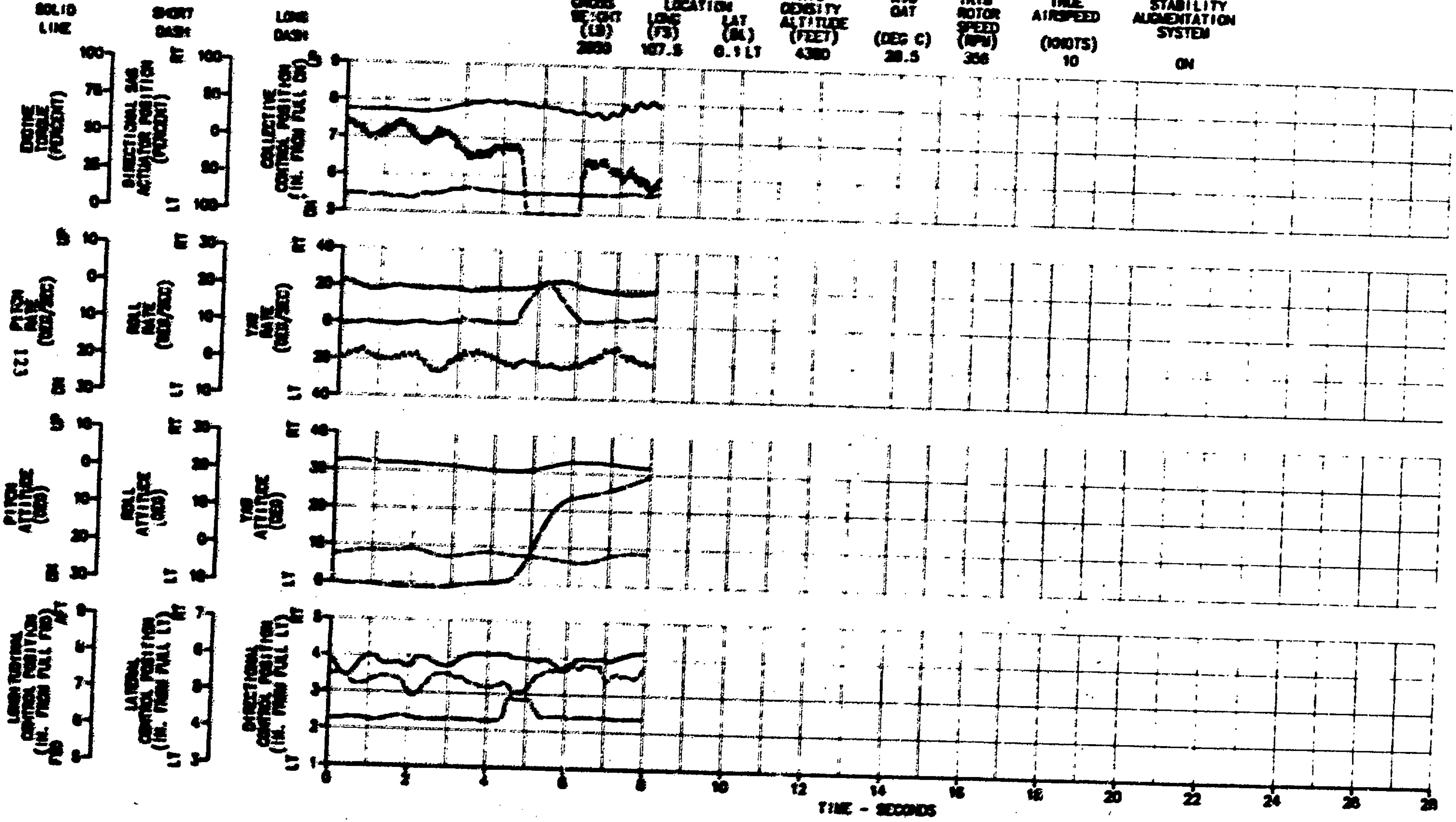


FIGURE E-88

RIGHT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH

JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2850	107.5	0.1 LT	4500	29.5	352	±0	OFF

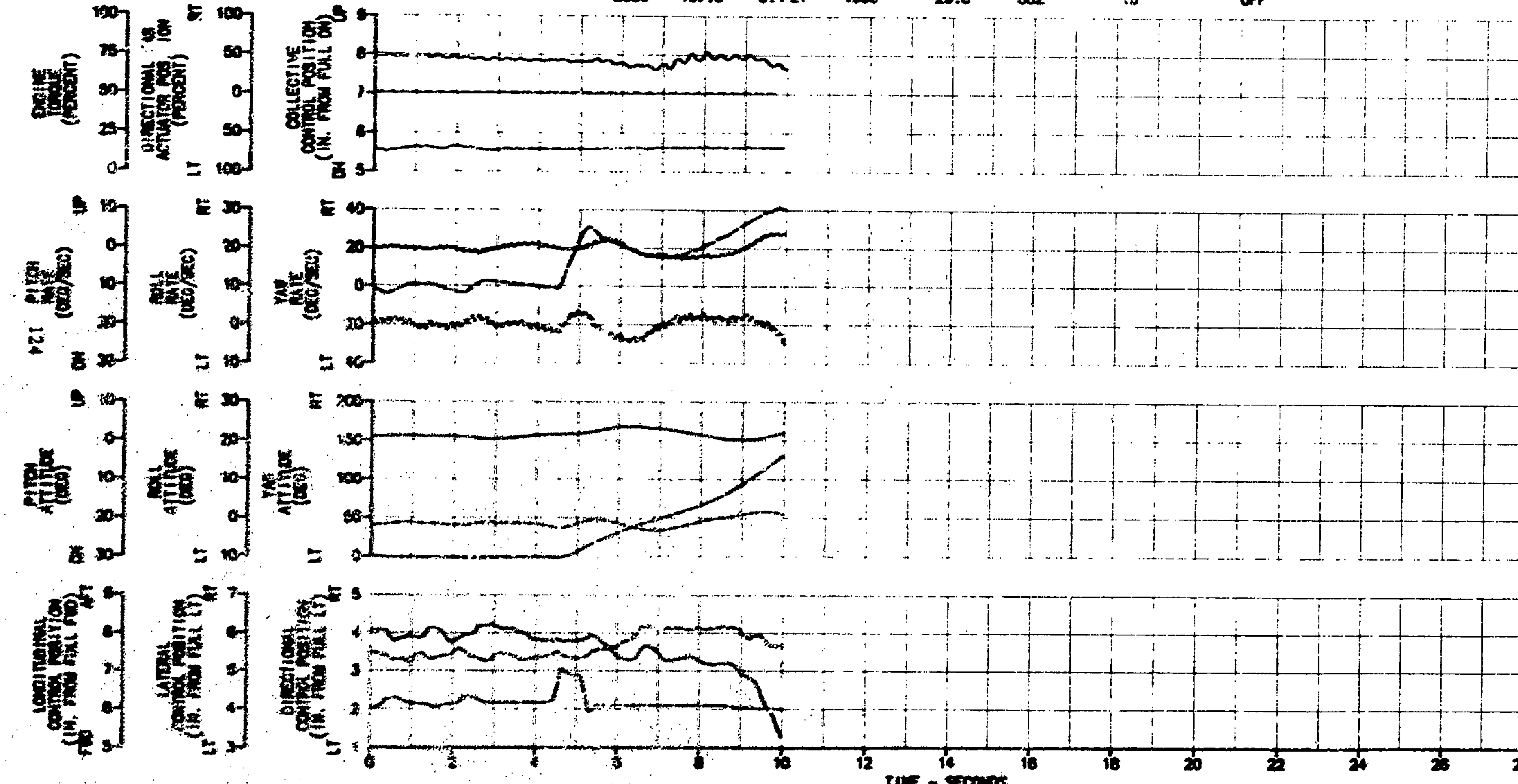


FIGURE E-89
LEFT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

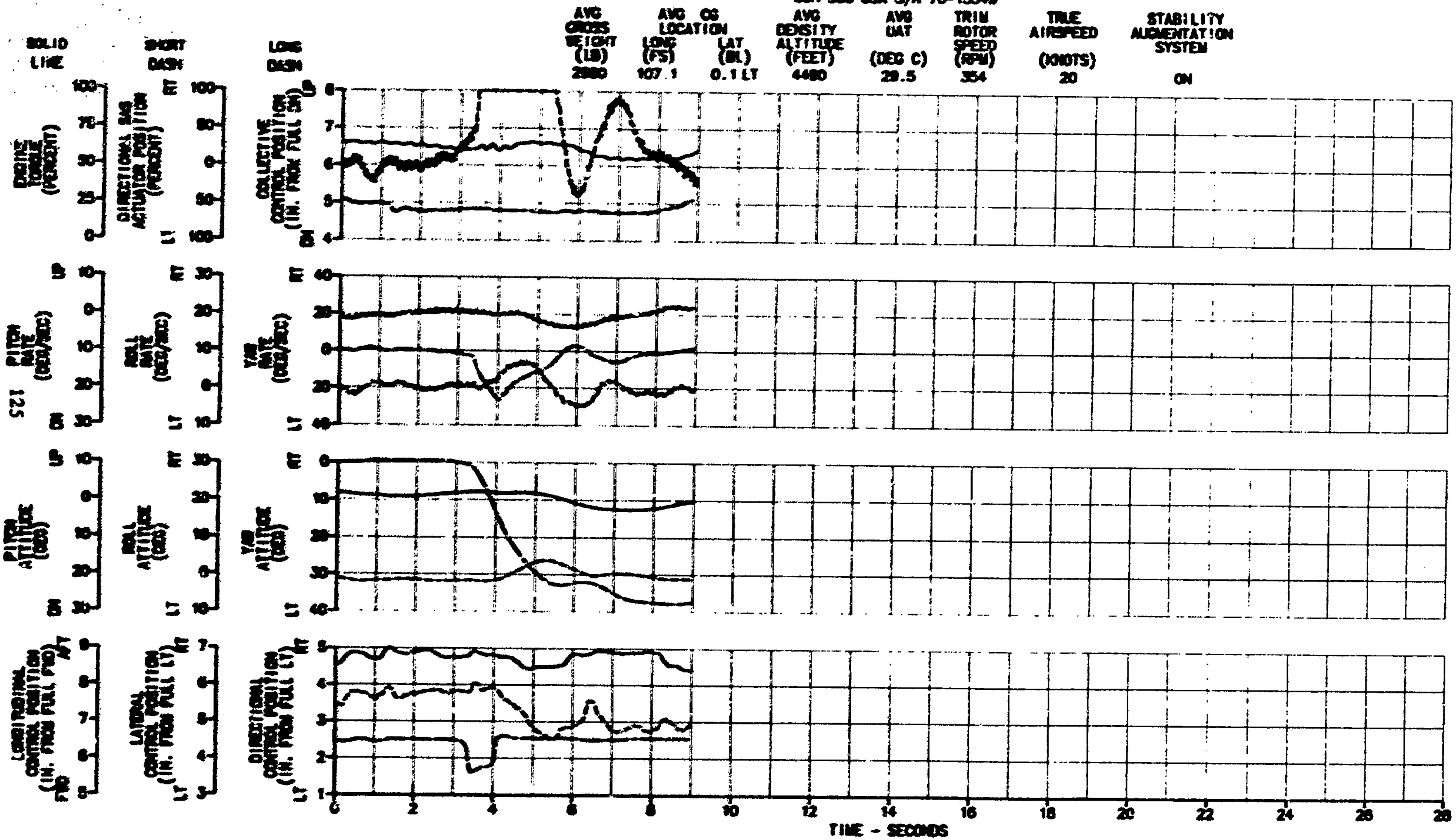


FIGURE E-90
LEFT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	107.1	0.1 LT	4380	28.5	353	20	OFF

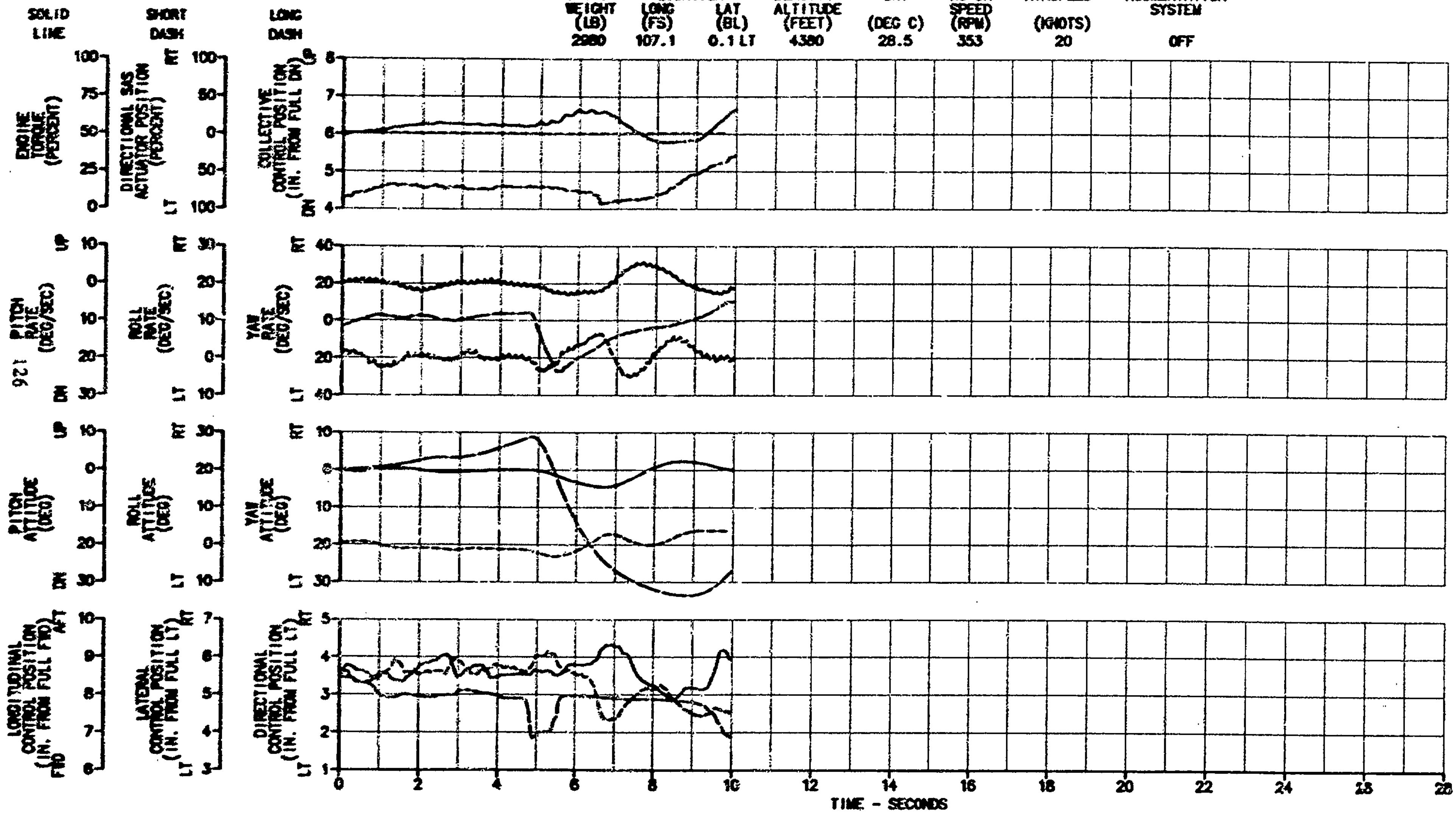


FIGURE E-91
RIGHT D'RECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

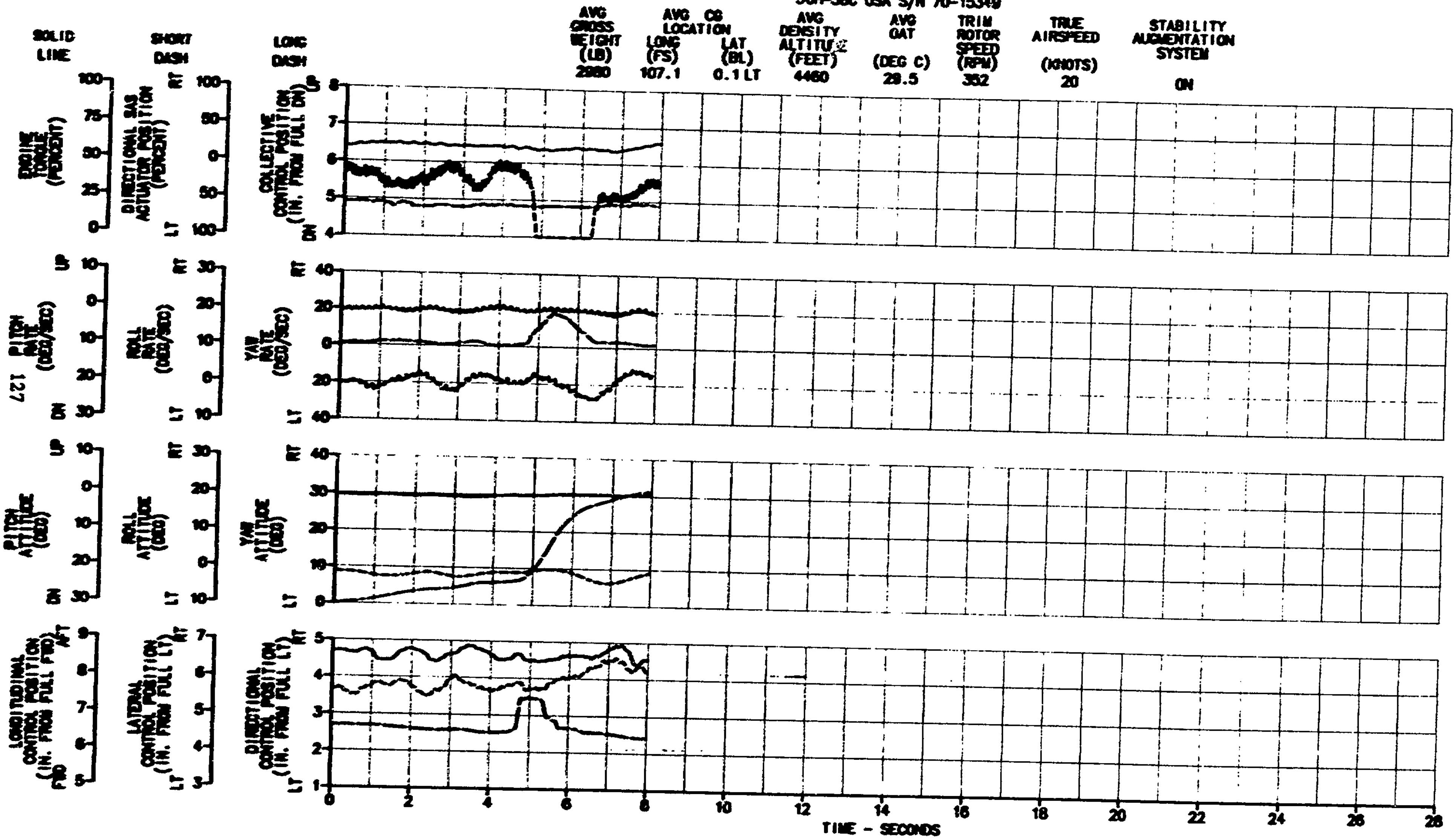


FIGURE E-92
RIGHT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

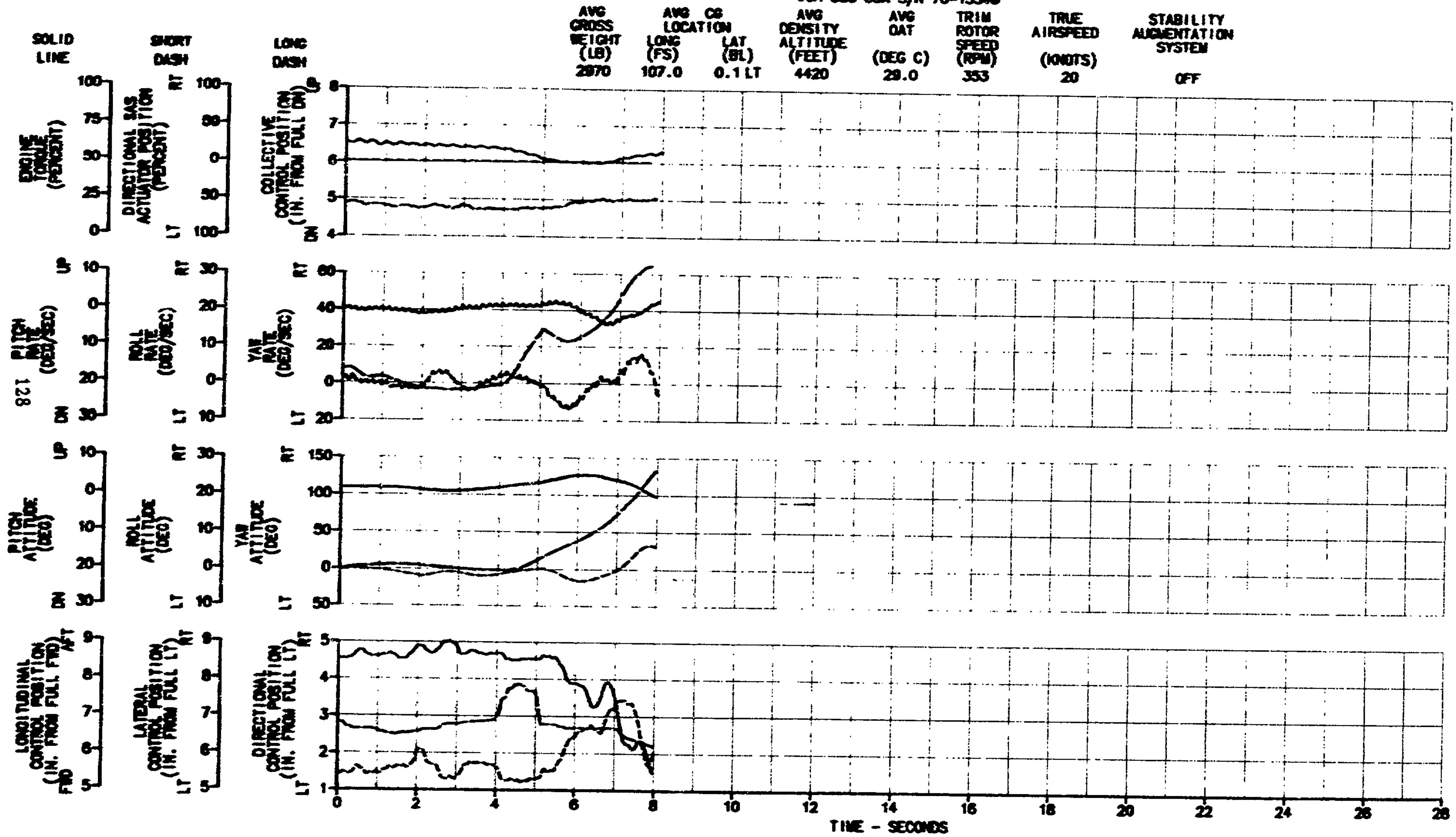


FIGURE E-93
LEFT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	107.0	0.1 LT	4350	28.0	353	30	ON

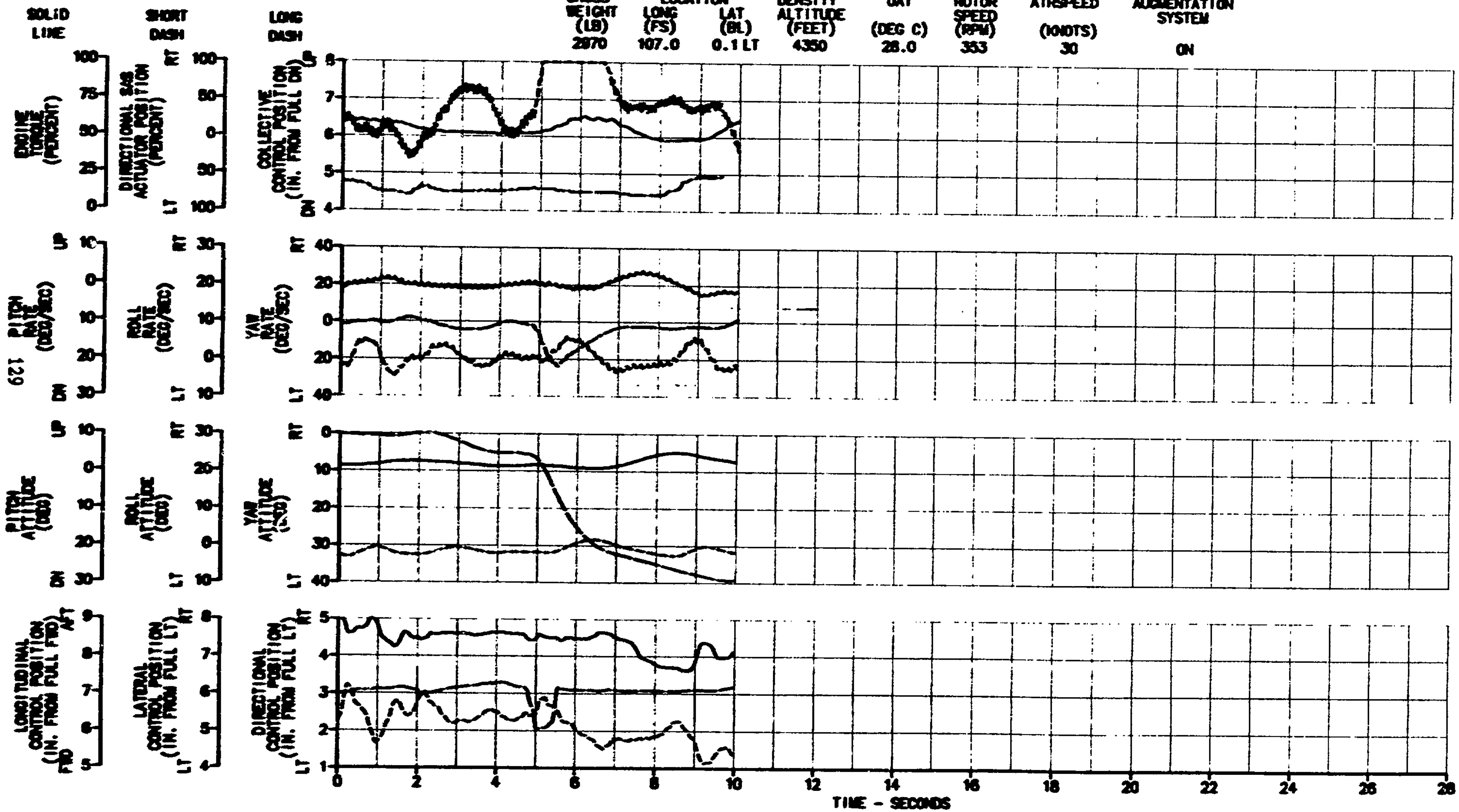


FIGURE E-94
LEFT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

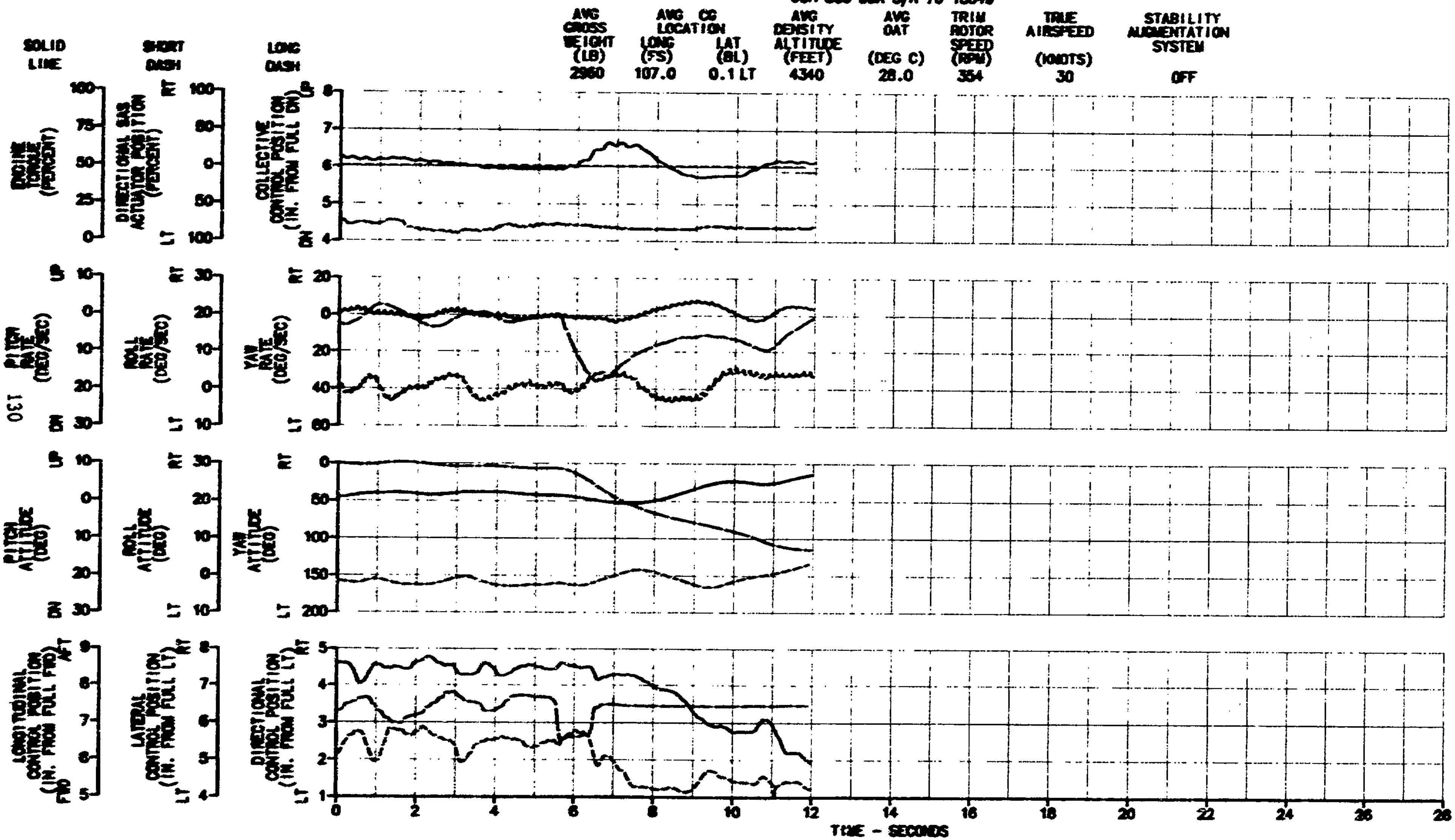


FIGURE E-95
RIGHT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	107.0	0.1 LT	4290	28.0	354	30	ON

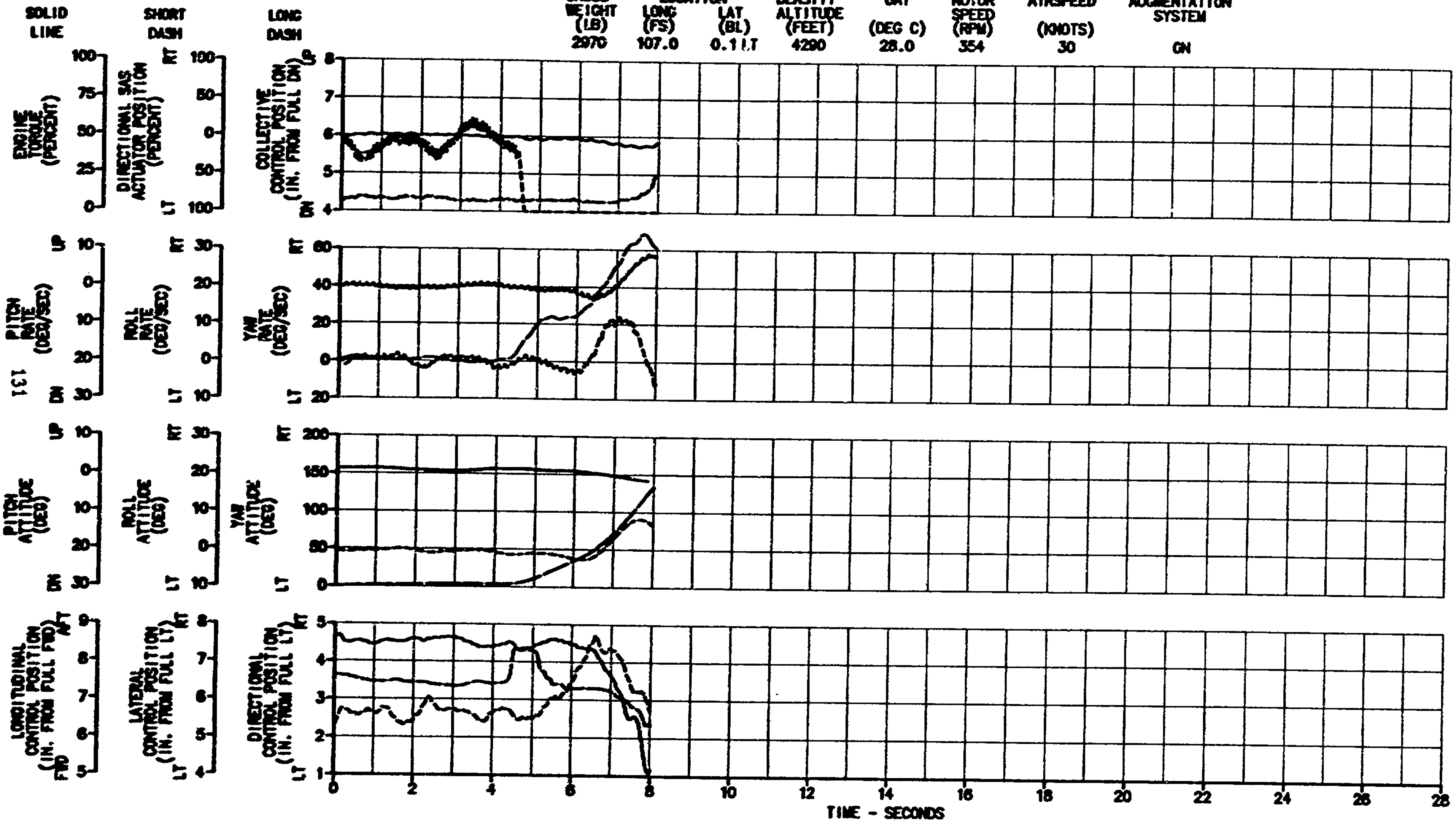


FIGURE E-96
RIGHT DIRECTIONAL PULSE INPUT - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	107.0	0.1 LT	4360	28.5	354	30	OFF

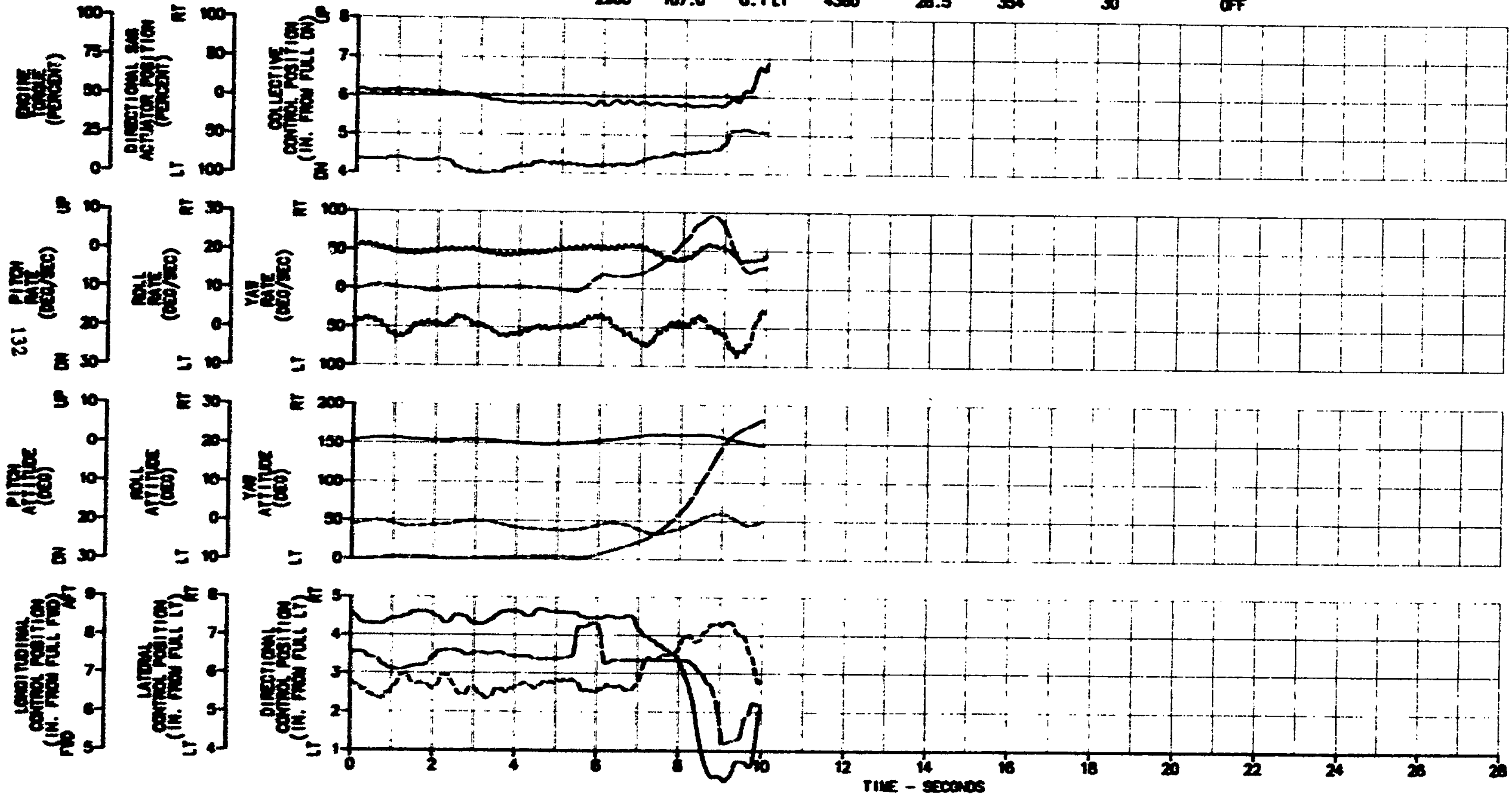


FIGURE E-97
LEFT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	108.0	0.1 LT	4170	26.5	353	0	ON

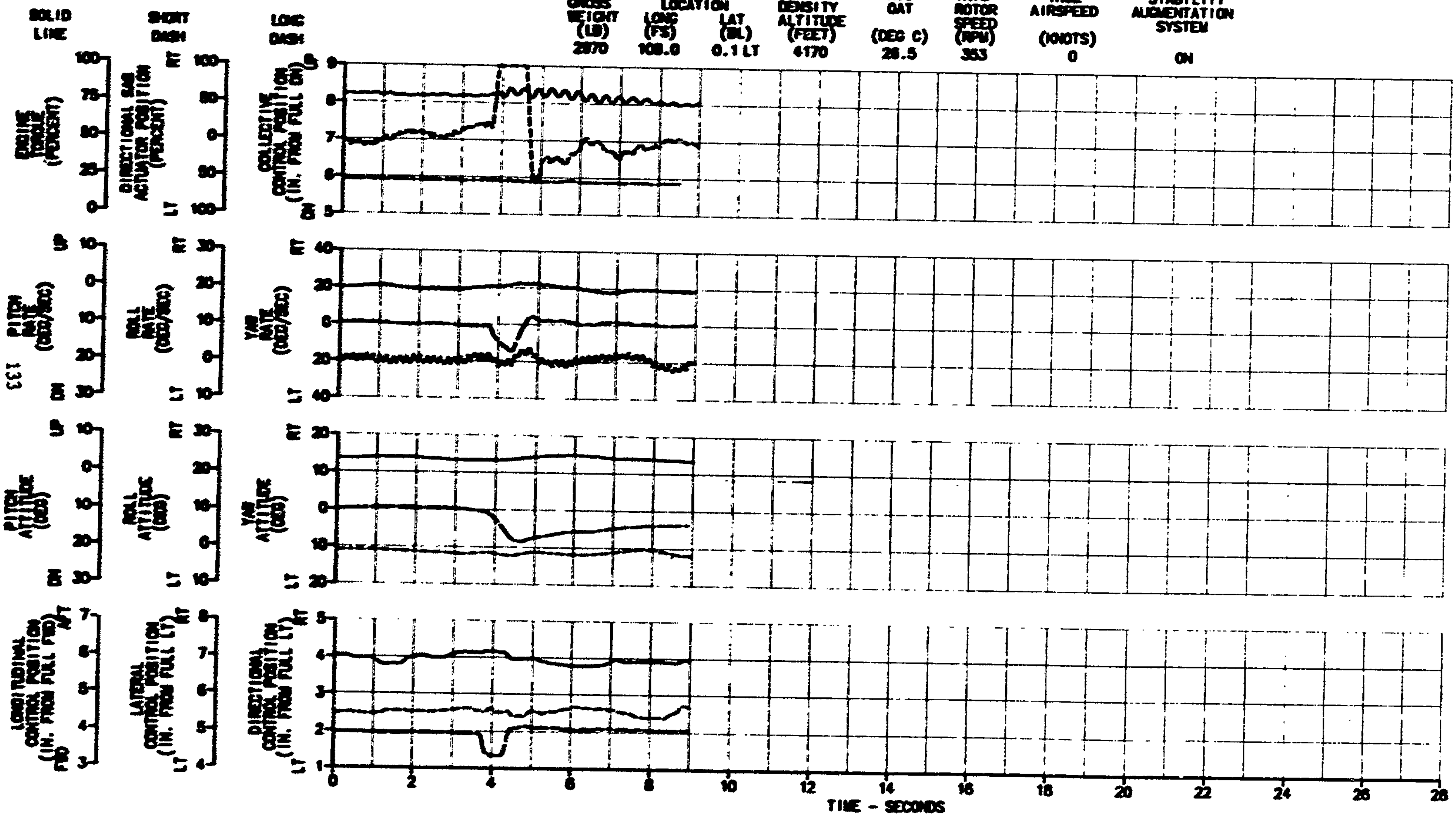


FIGURE E-98
LEFT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

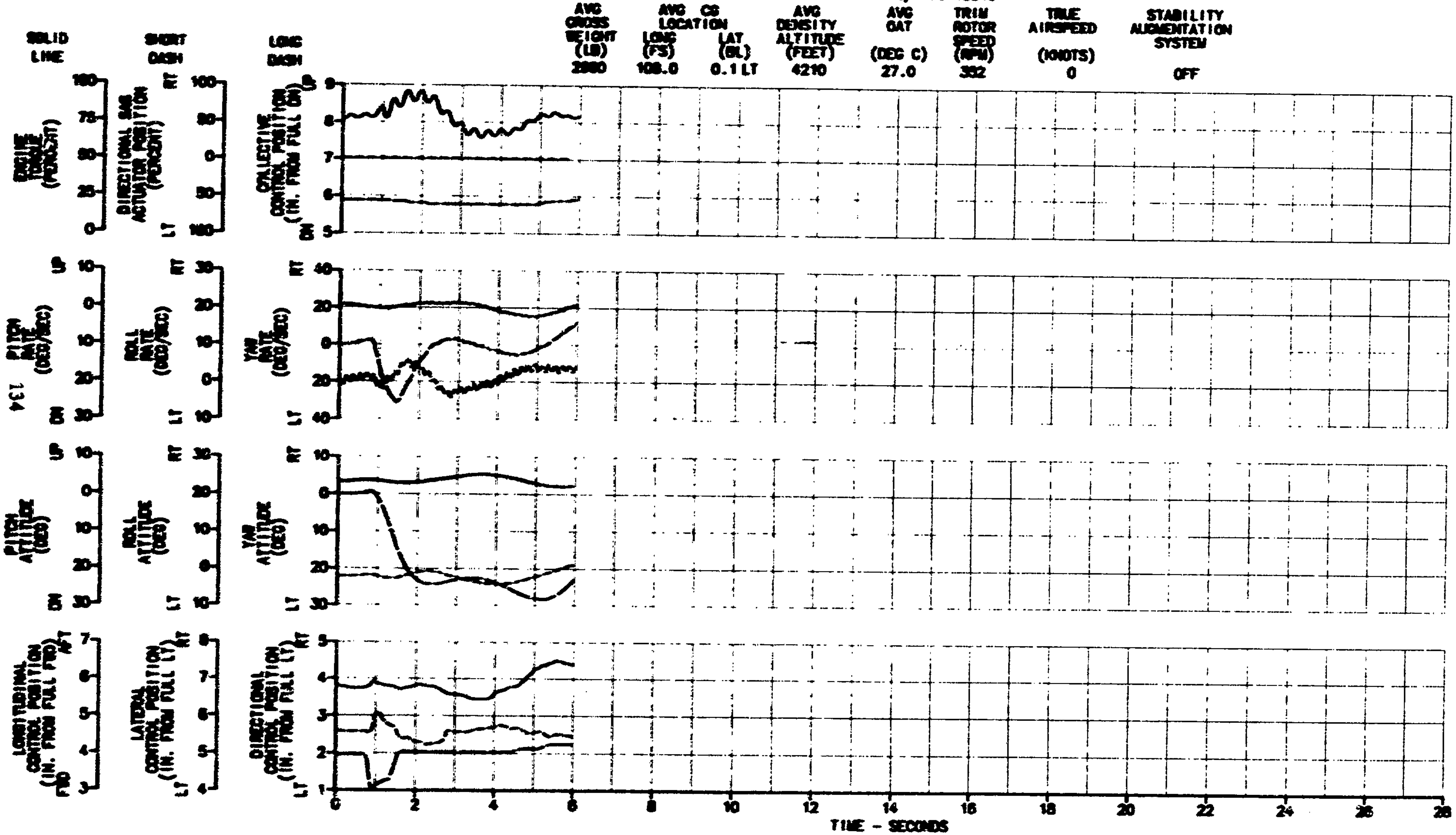


FIGURE E-99
RIGHT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.0	0.1 LT	4200	27.0	353	0	ON

FIGURE E-100
RIGHT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2860	108.8	0.1 LT	4240	27.5	354	0	OFF

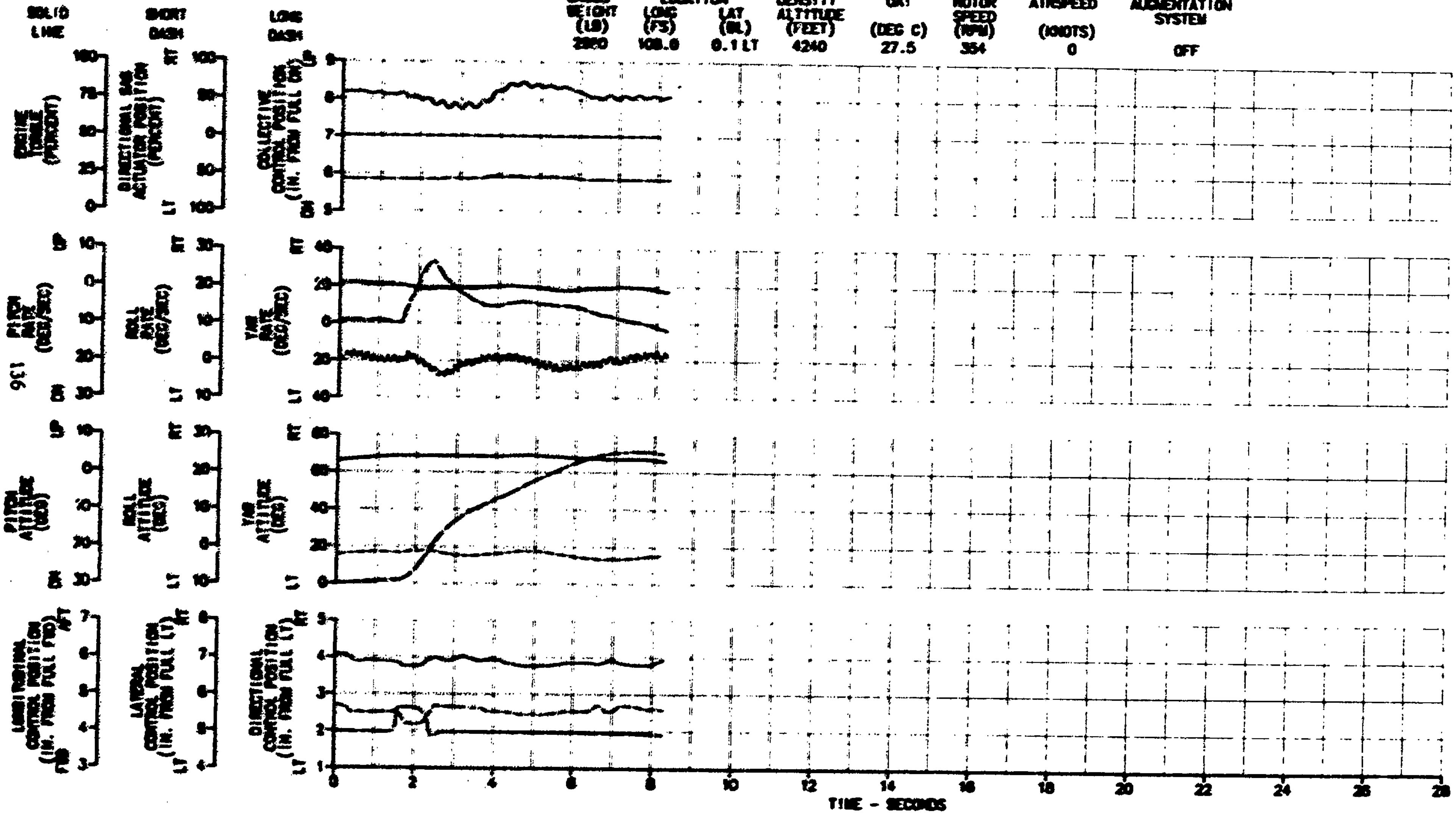


FIGURE E-101
LEFT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.0	0.1 LT	4280	27.5	356	10	ON

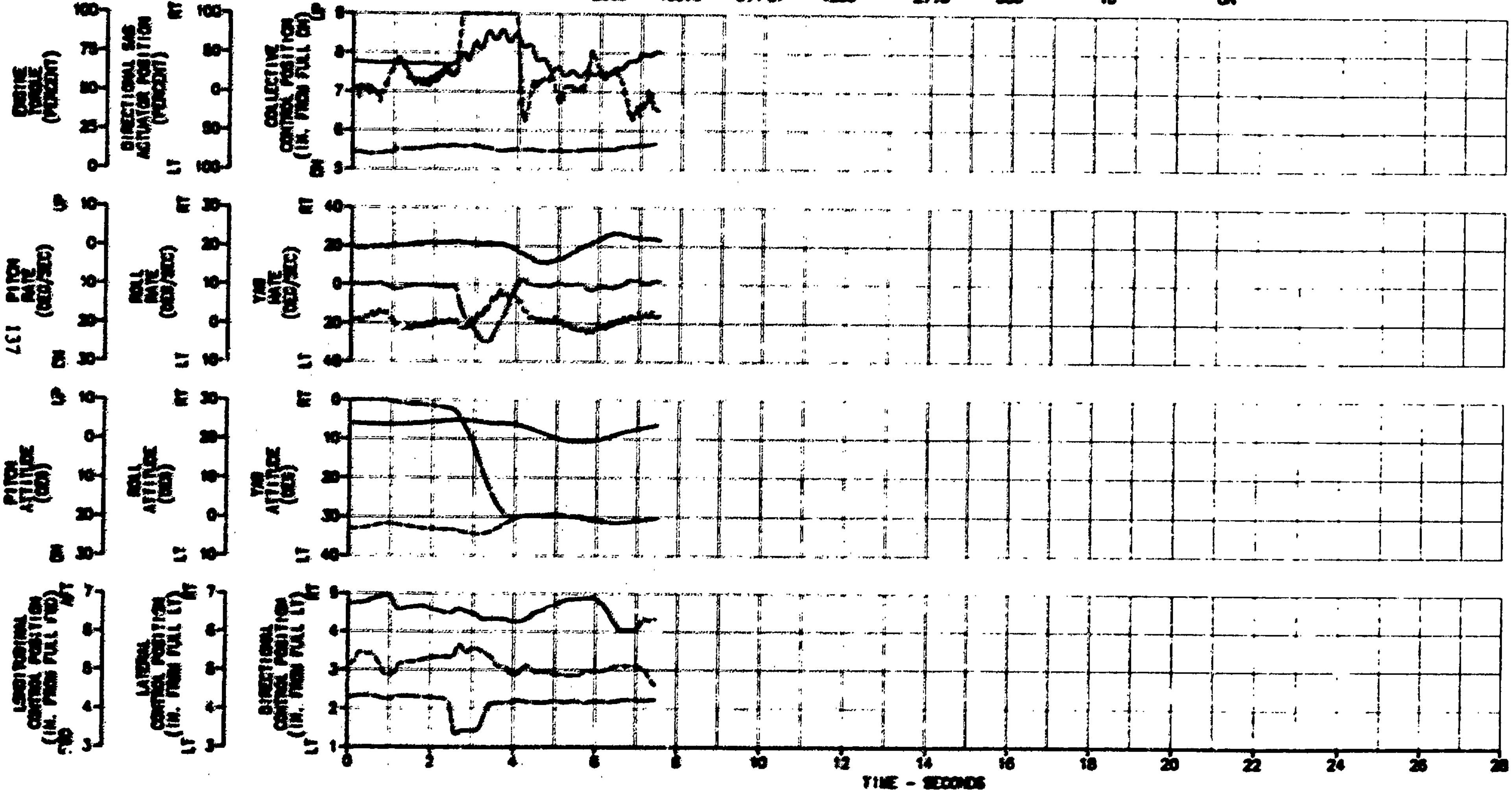


FIGURE E-102
LEFT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

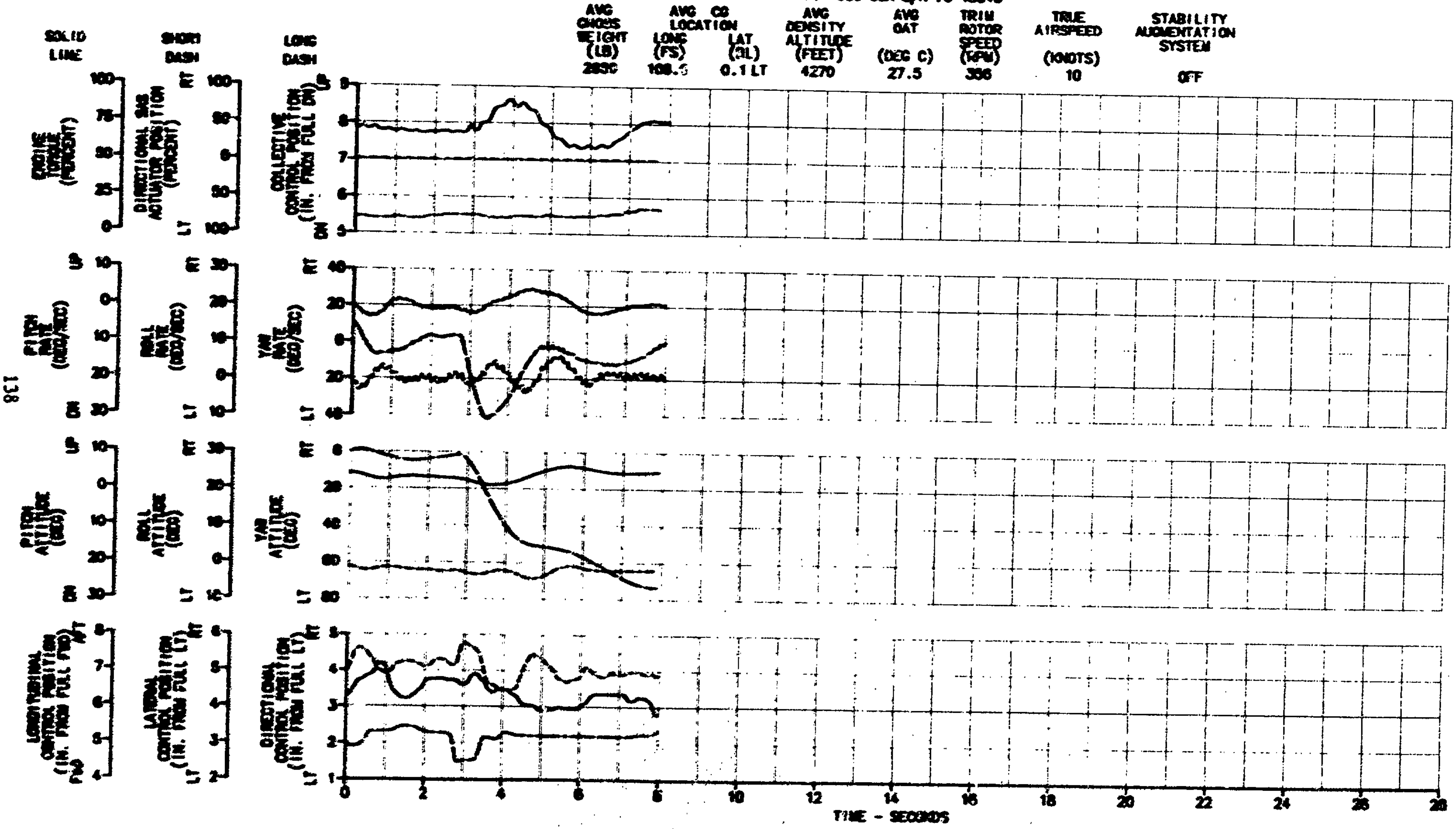


FIGURE E-103
RIGHT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

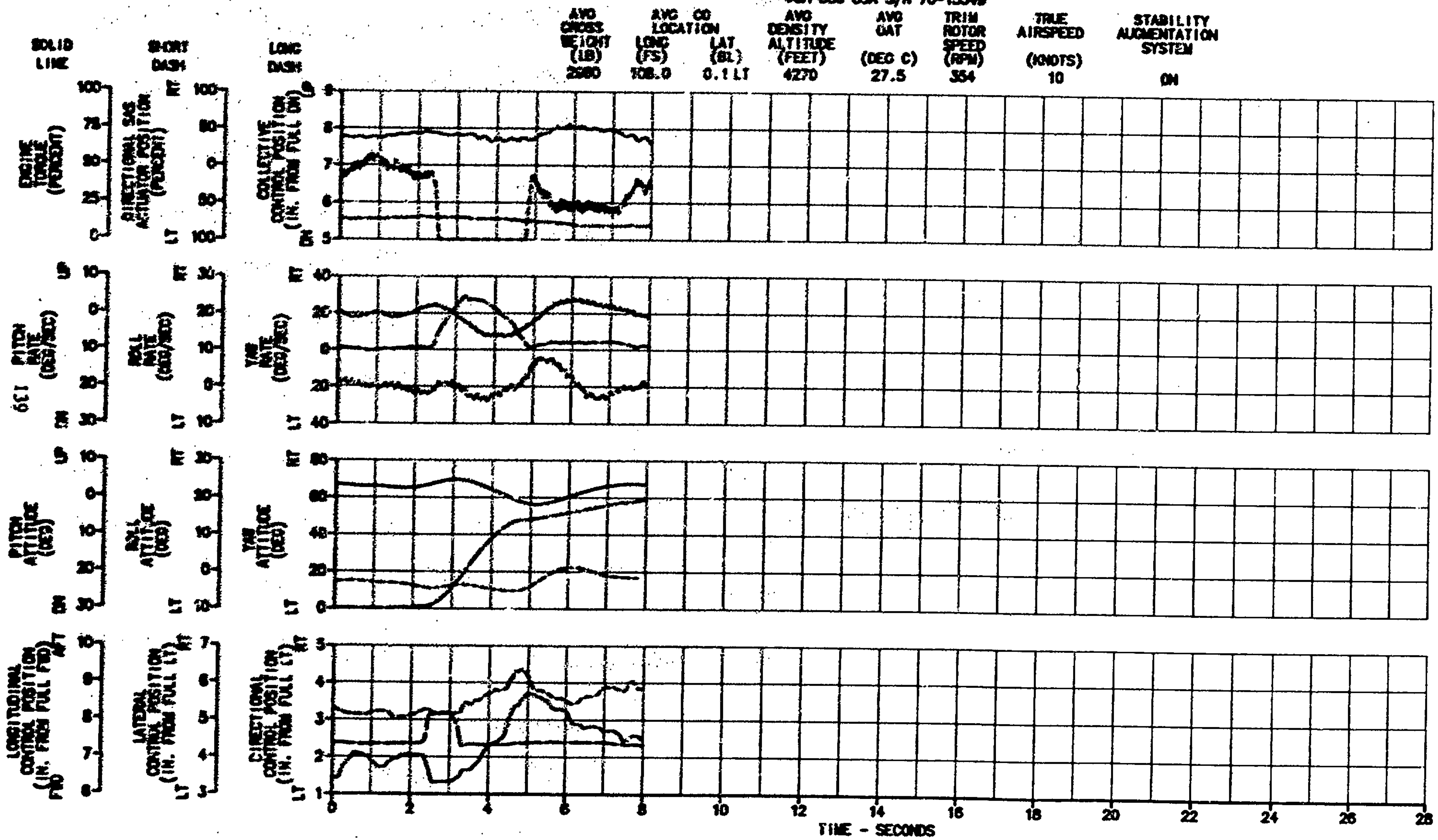


FIGURE E-104
RIGHT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2850	108.0	0.1 LT	4270	27.5	352	10	OFF

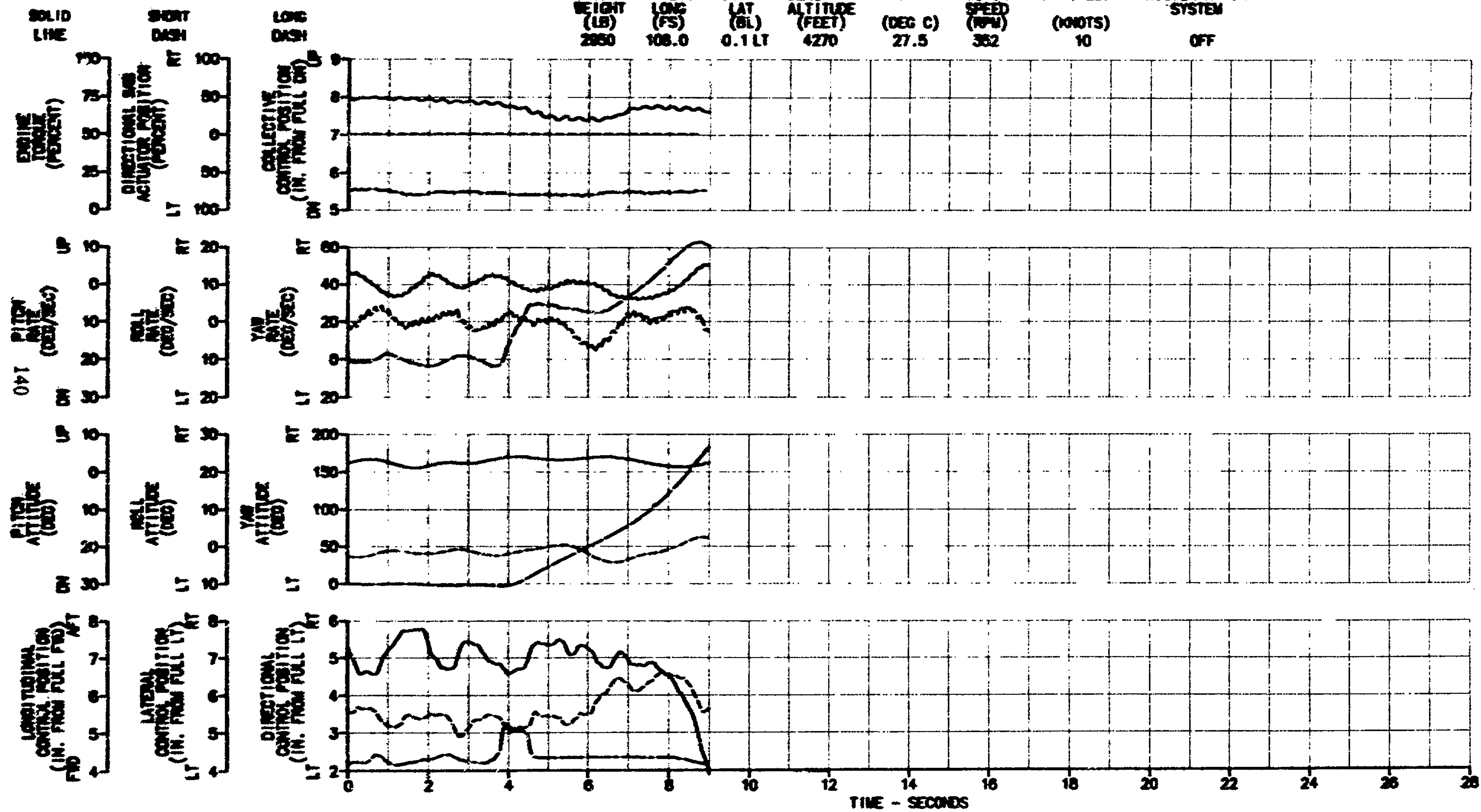


FIGURE E-105
LEFT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

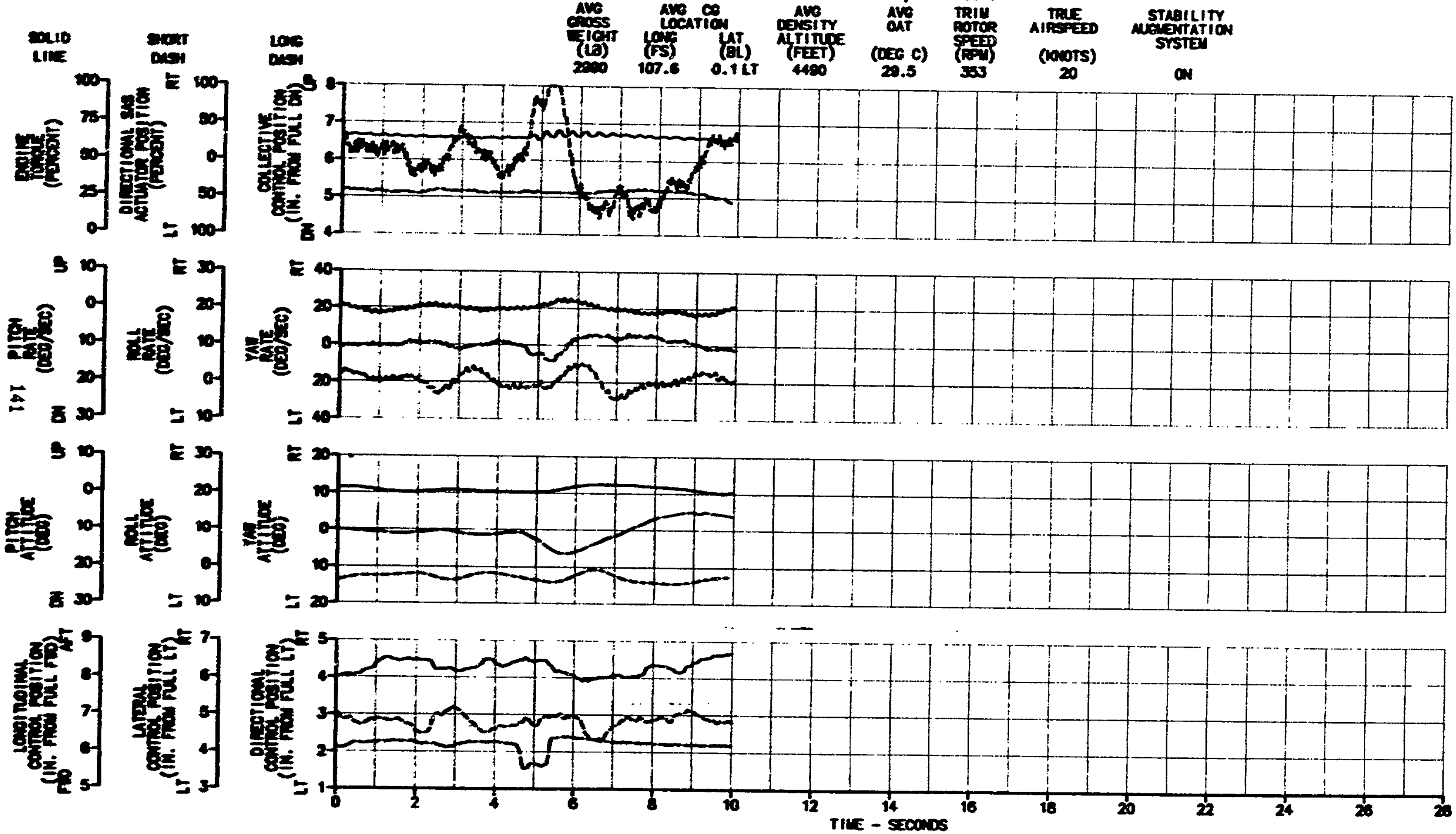


FIGURE E-106
LEFT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

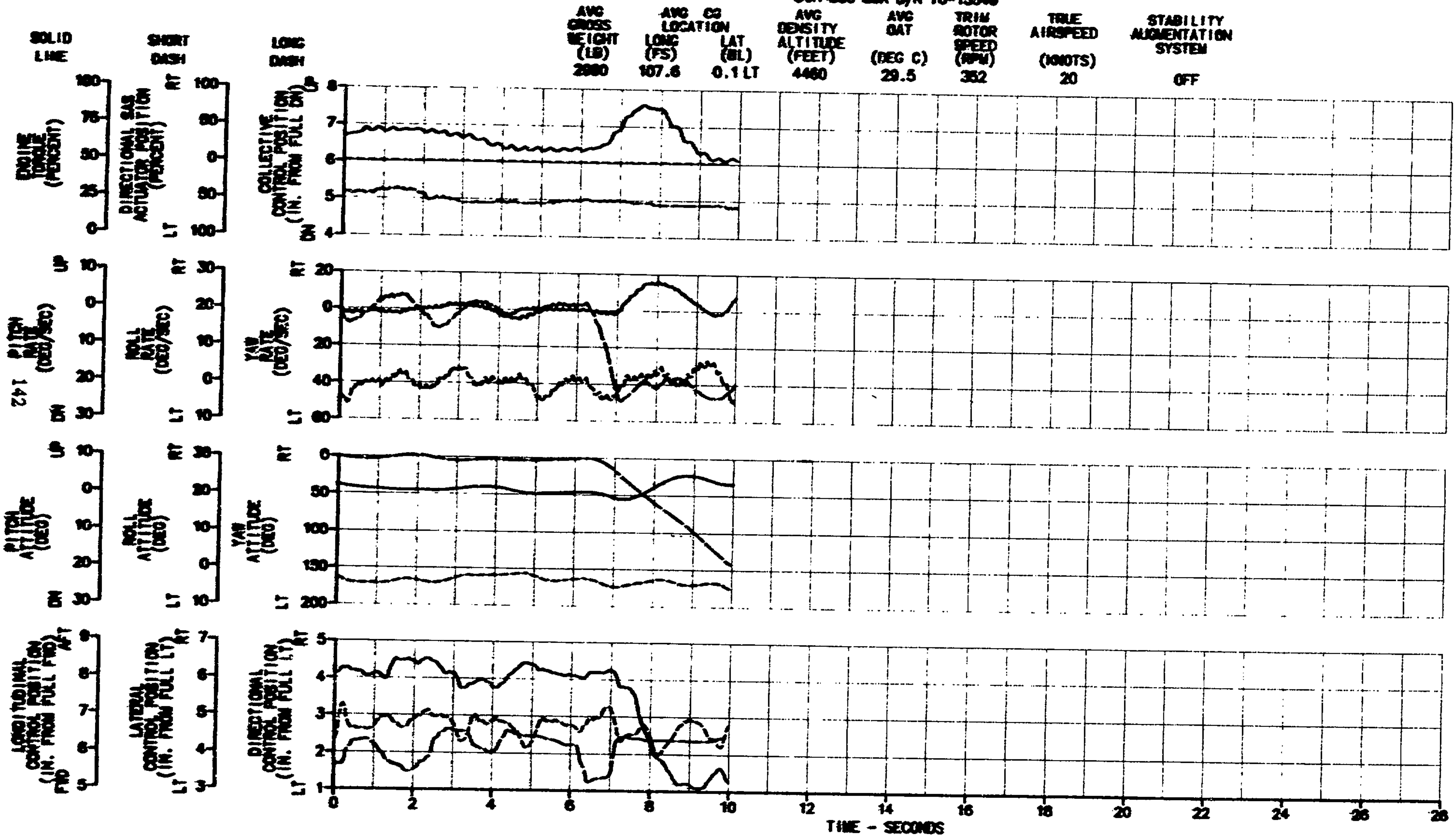


FIGURE E-107
RIGHT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	107.6	0.1 LT	4410	29.0	352	20	OFF

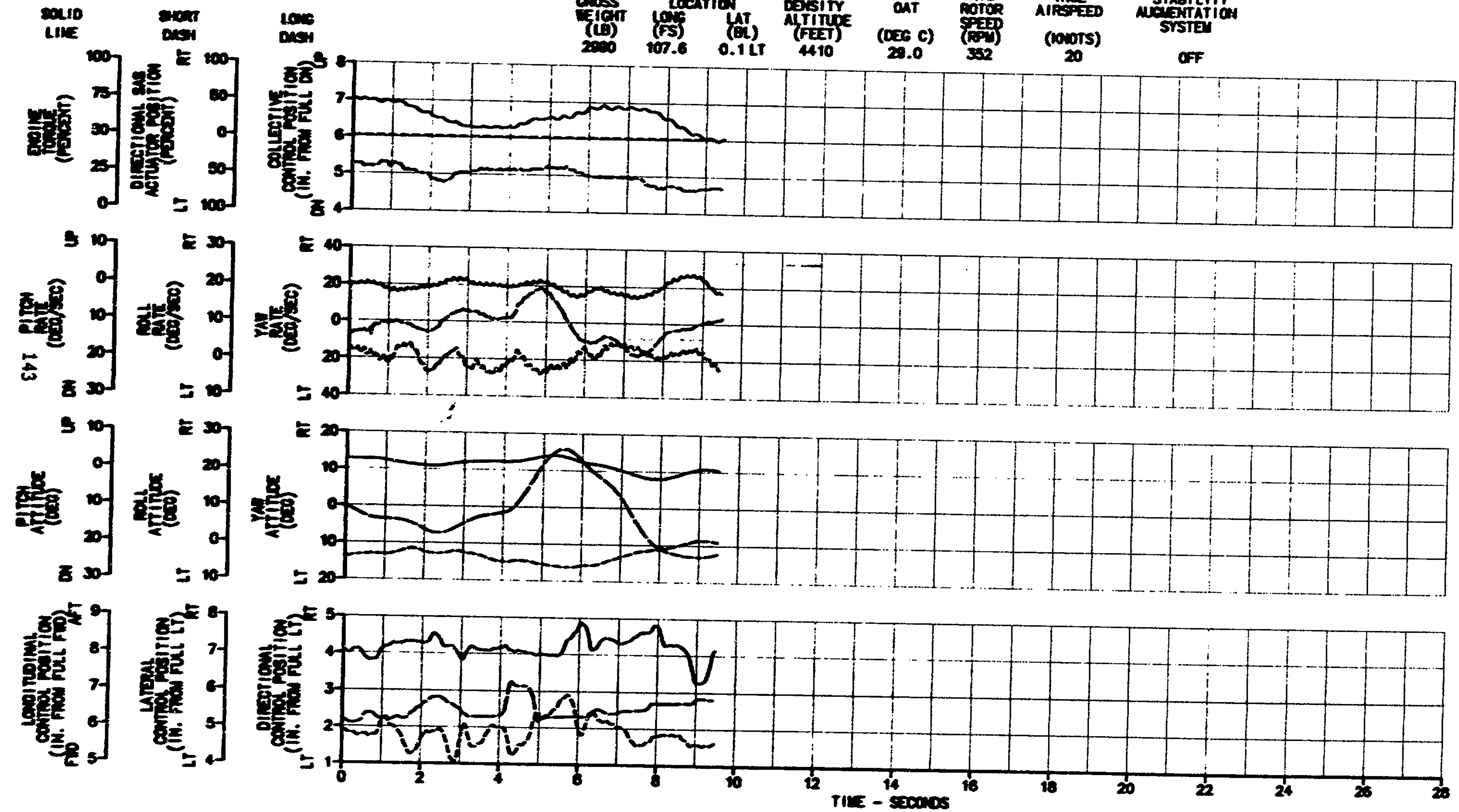


FIGURE E-106
LEFT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
OH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	107.6	0.1 LT	4320	28.0	384	30	ON

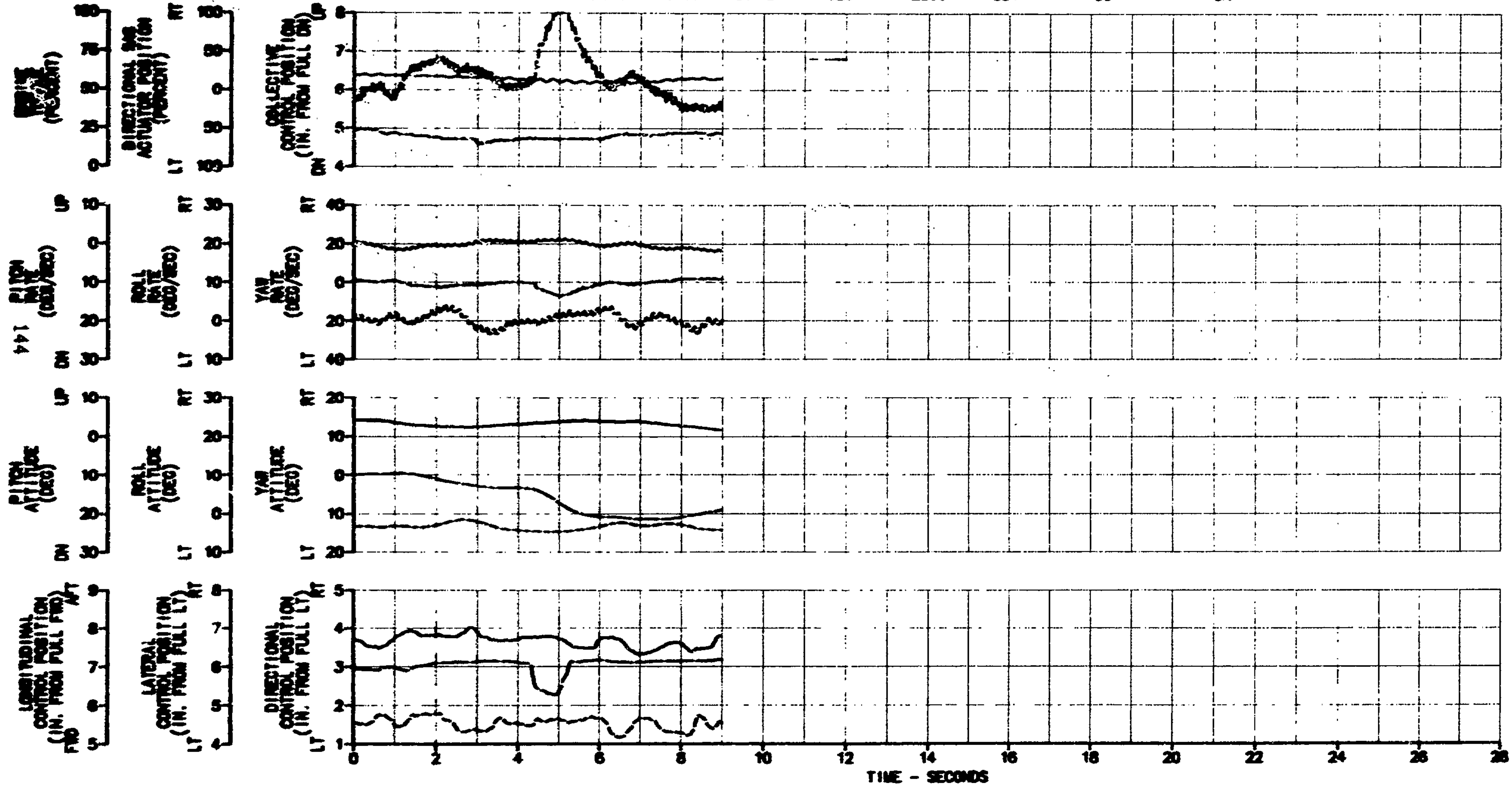


FIGURE E-109
LEFT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	107.5	0.1 LT	4220	27.0	356	30	OFF

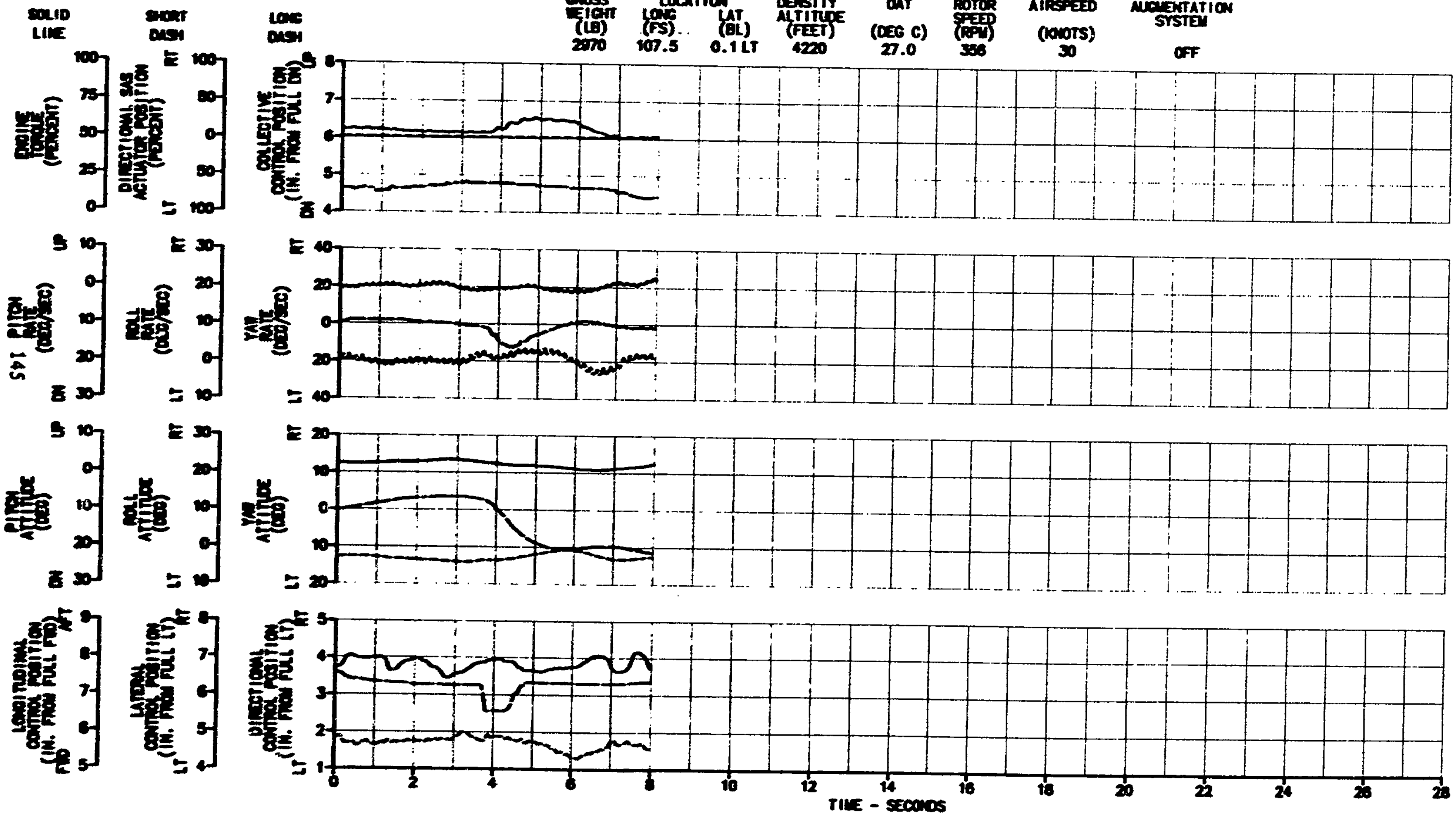


FIGURE E-110
RIGHT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	107.6	0.1 LT	4300	28.0	354	30	ON

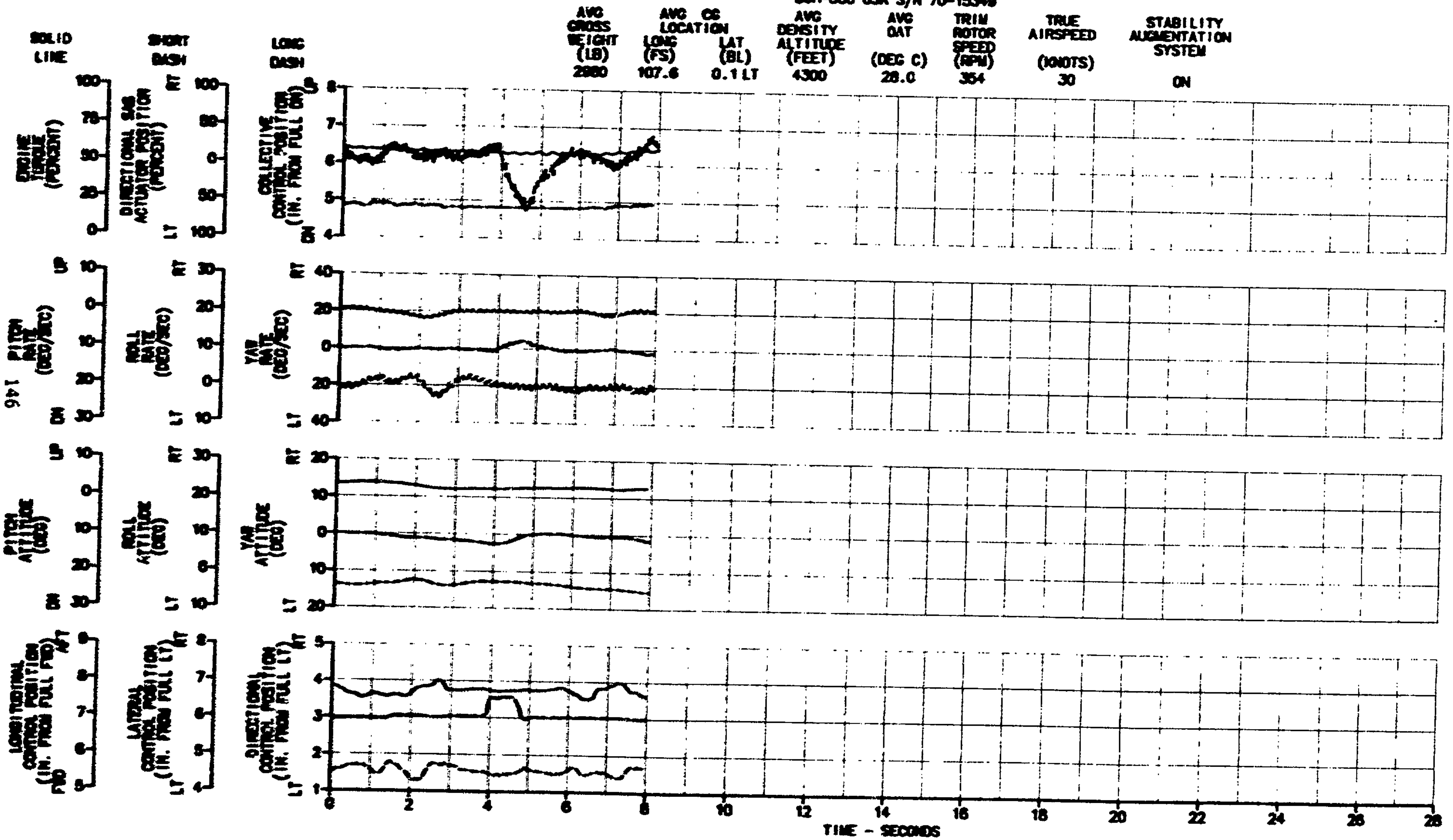


FIGURE E-111
RIGHT DIRECTIONAL PULSE INPUT - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

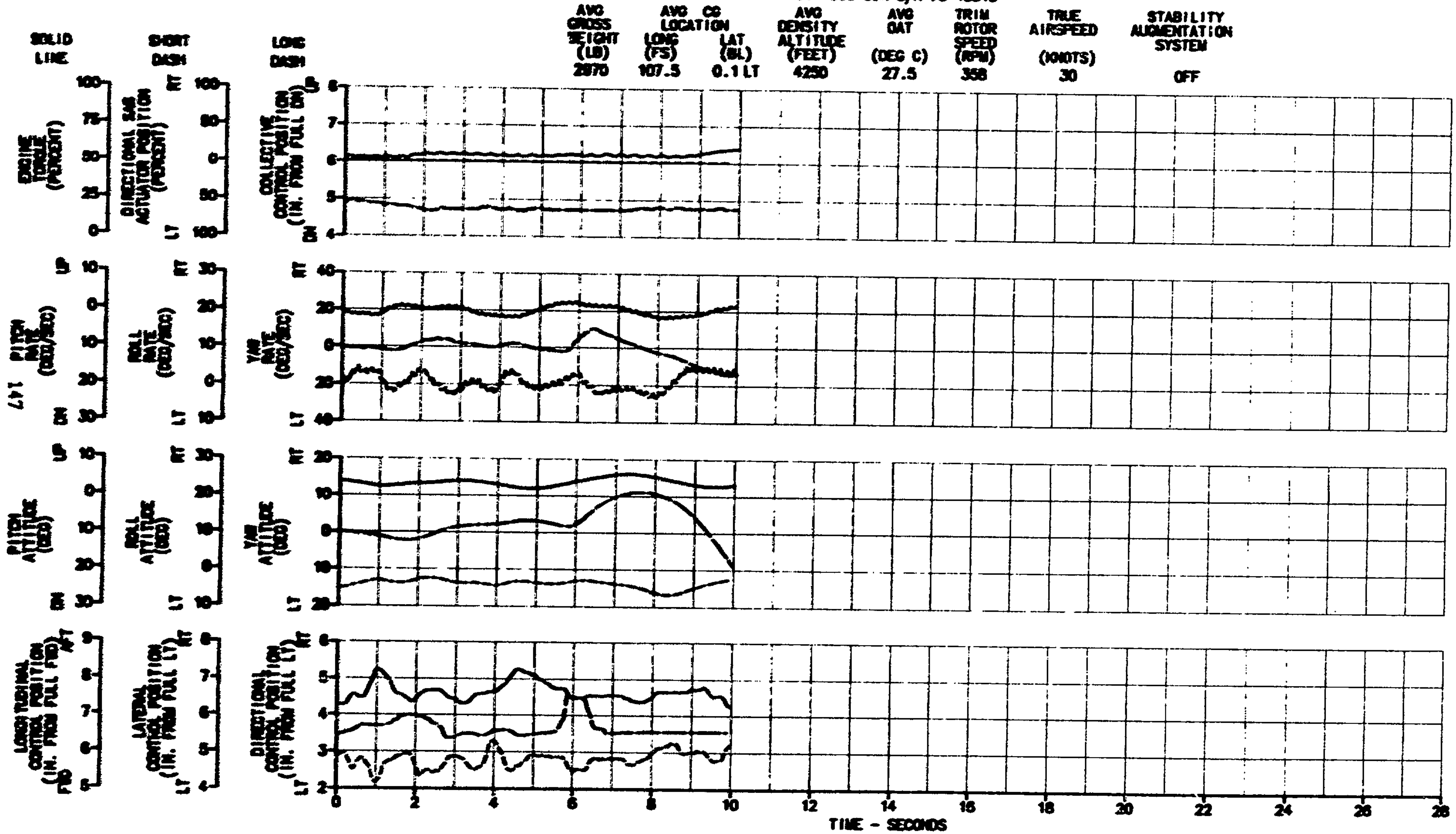


FIGURE E-112
LEFT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.7	0.1 LT	4180	26.5	352	0	ON

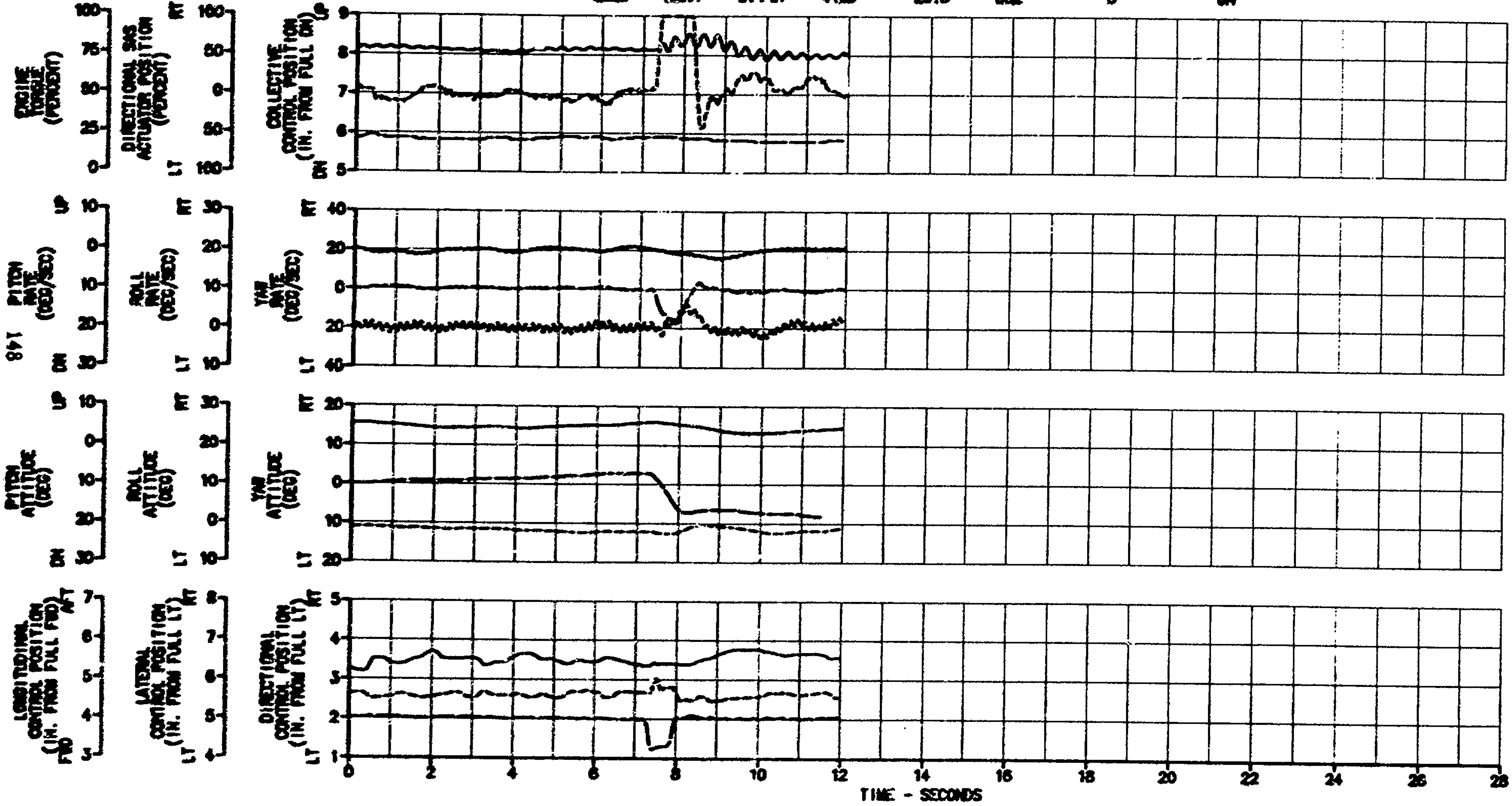


FIGURE E-113
LEFT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	108.7	0.1 LT	4260	27.5	353	0	OFF

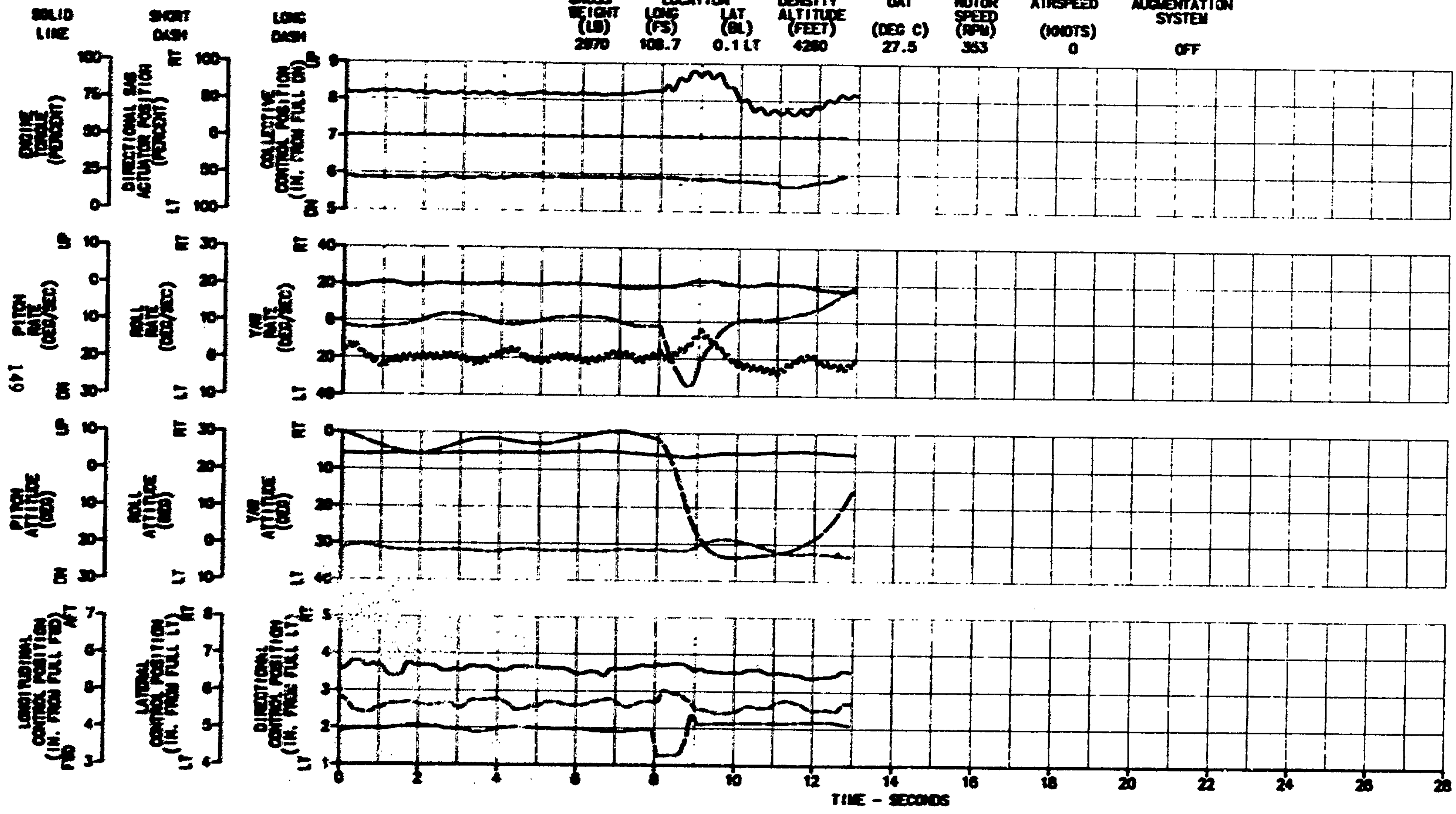


FIGURE 5-114
RIGHT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

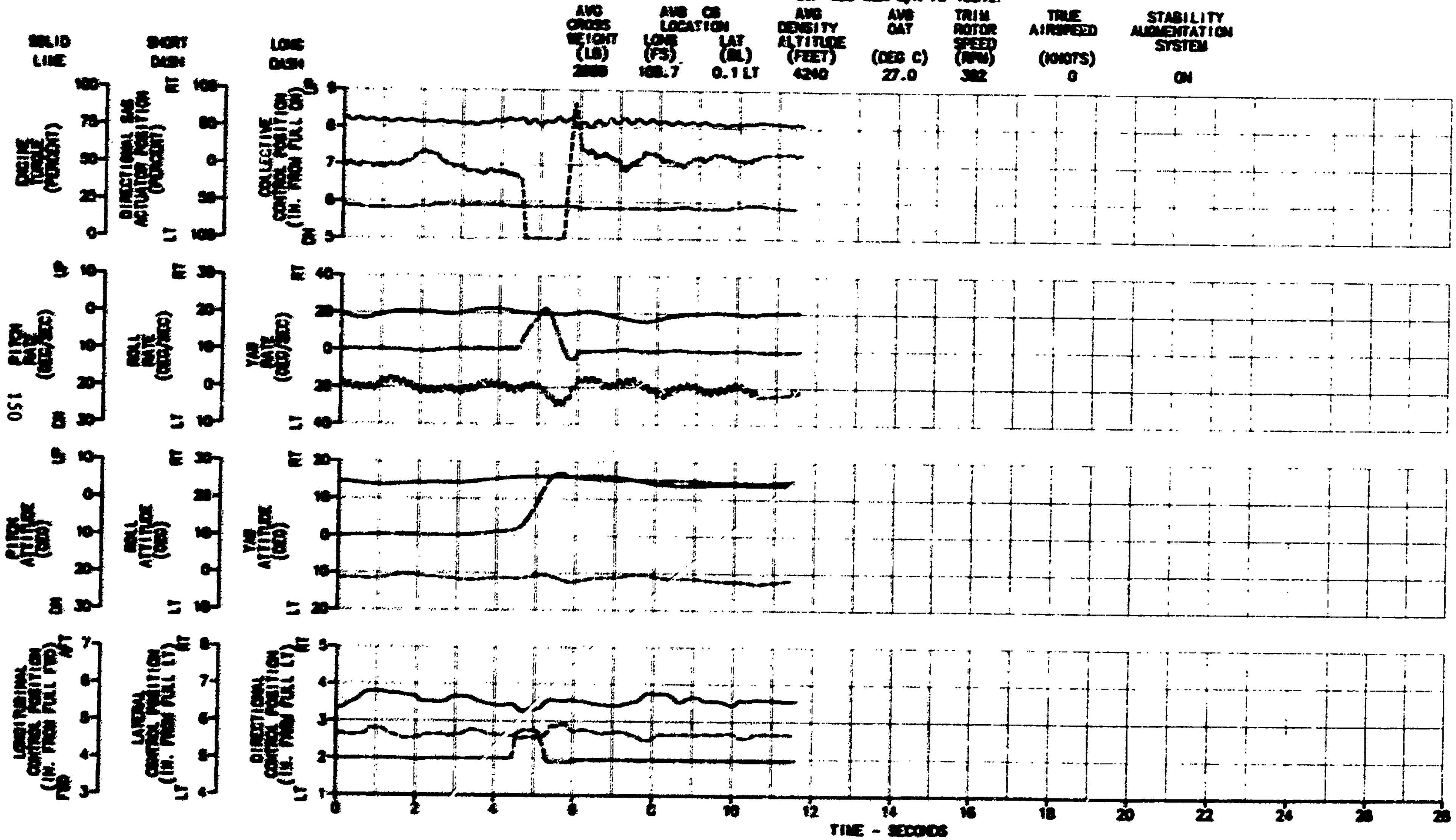


FIGURE E-115
RIGHT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	108.7	0.1 LT	4310	28.0	352	0	OFF

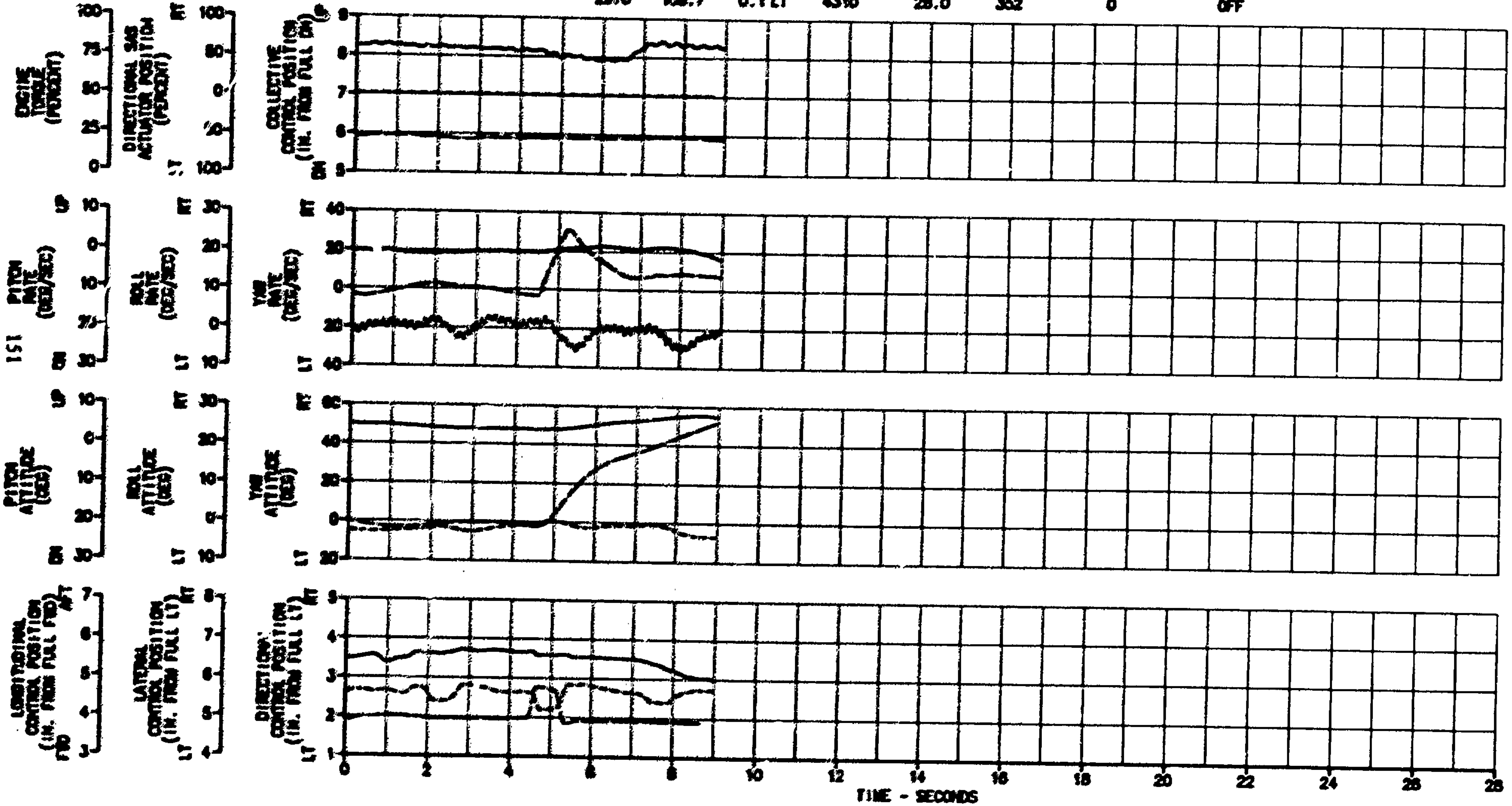


FIGURE E-116
LEFT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2860	108.6	0.1 LT	4250	27.5	354	10	ON

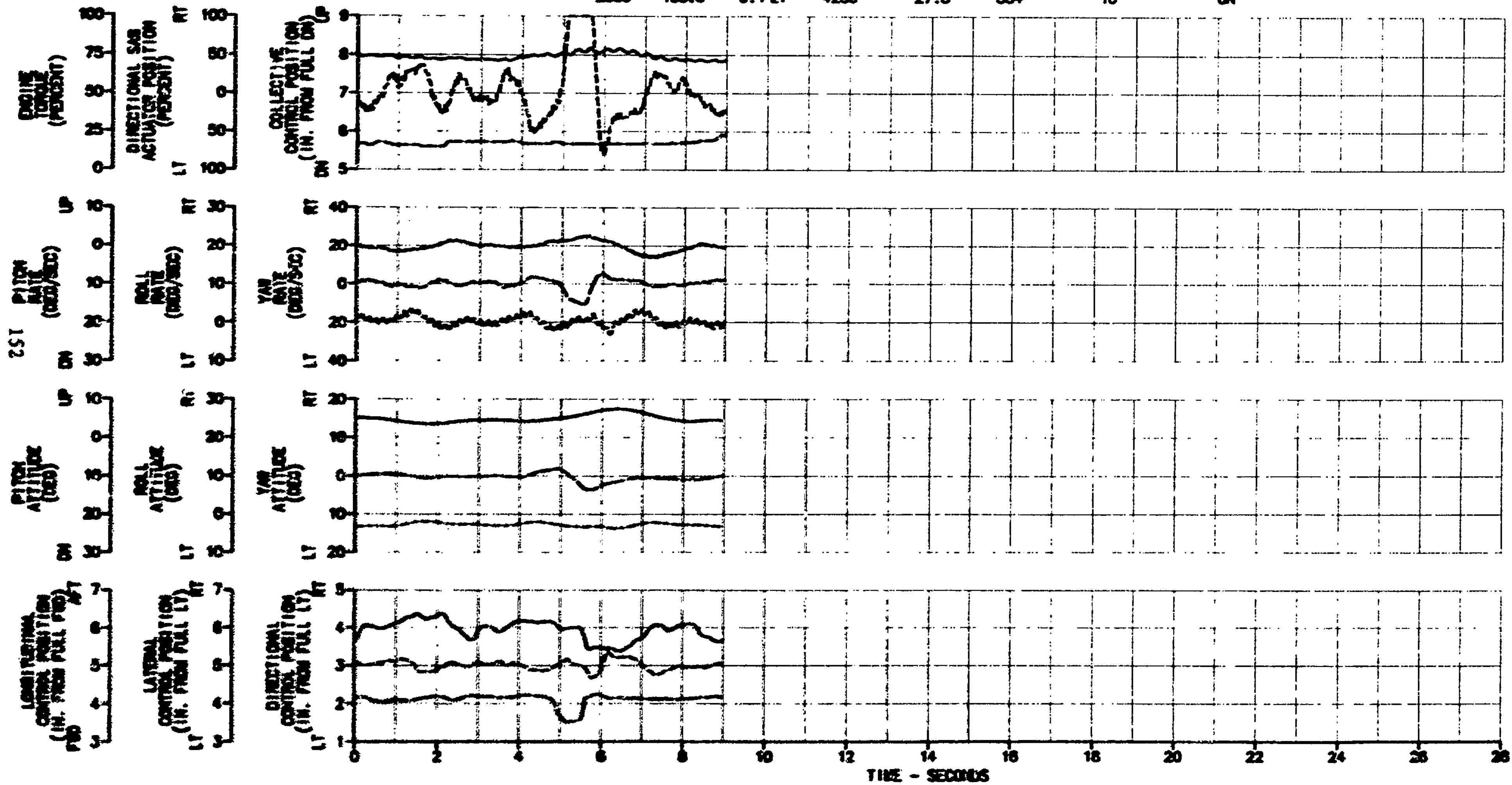


FIGURE E-117
LEFT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

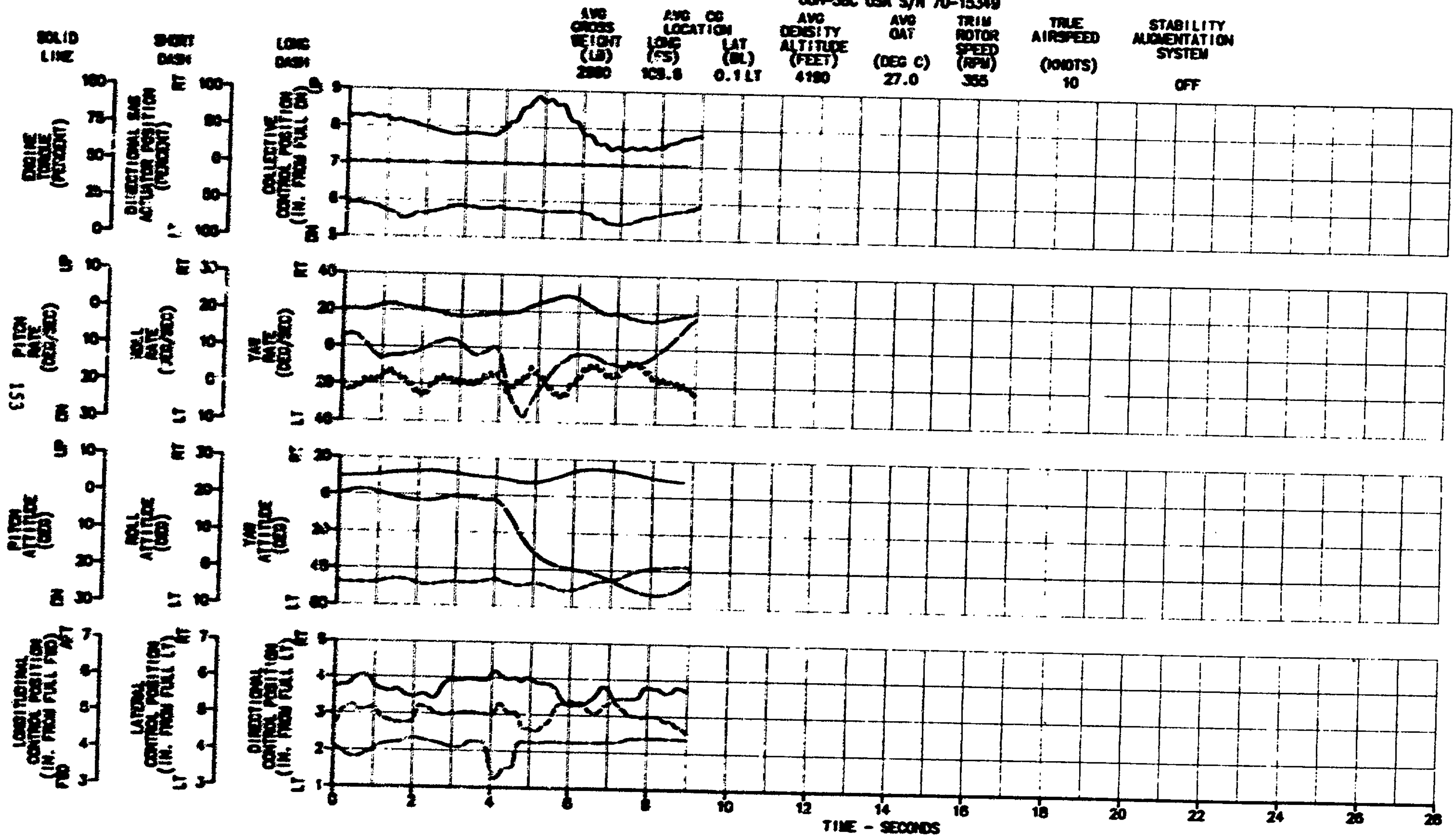


FIGURE E-118
RIGHT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.6	0.1 LT	4210	27.0	353	10	ON

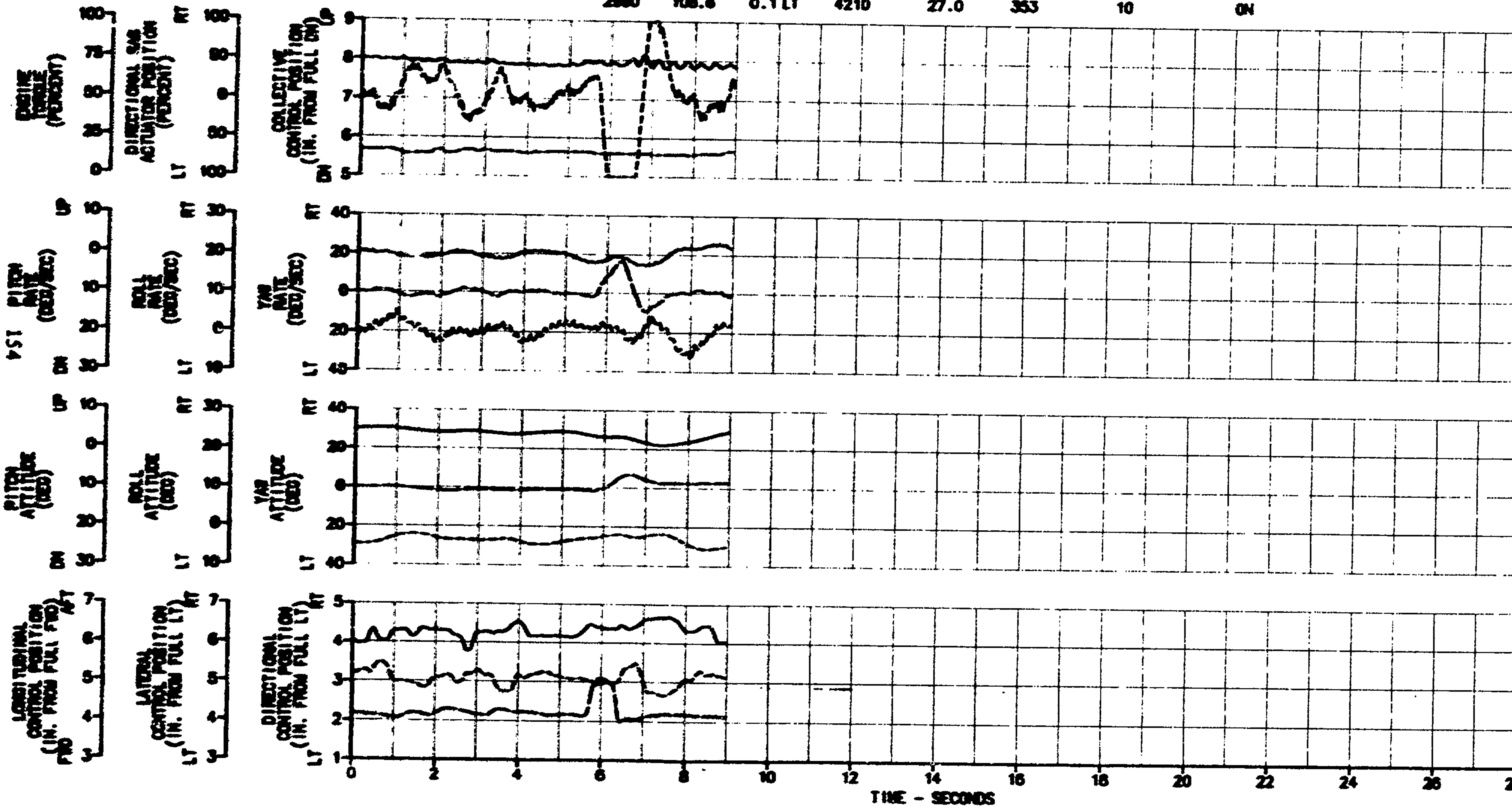


FIGURE E-119
RIGHT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2960	108.6	0.1 LT	4190	26.5	353	10	OFF

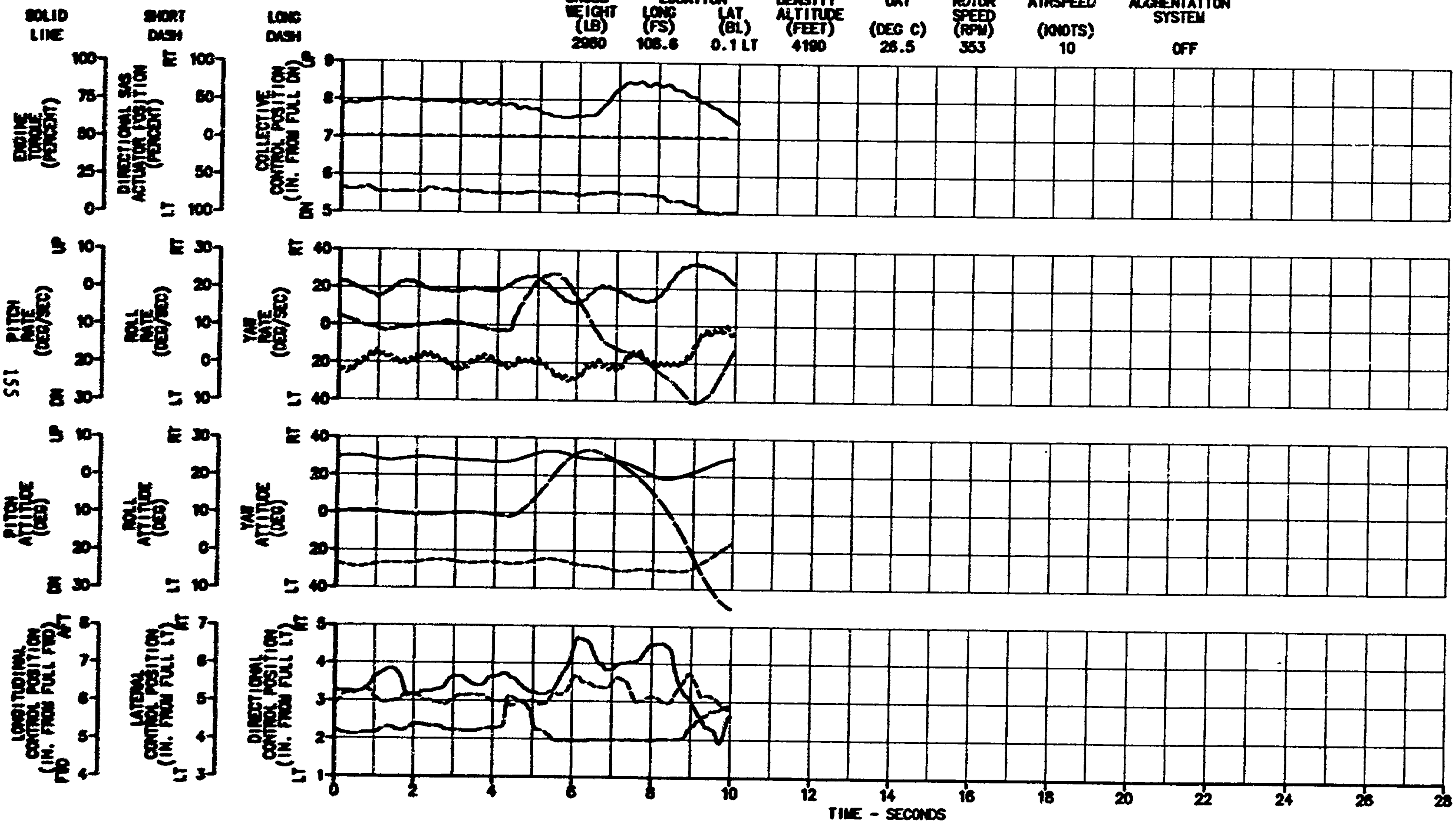


FIGURE E-120
LEFT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2850	108.6	0.1 LT	4150	26.5	354	20	ON

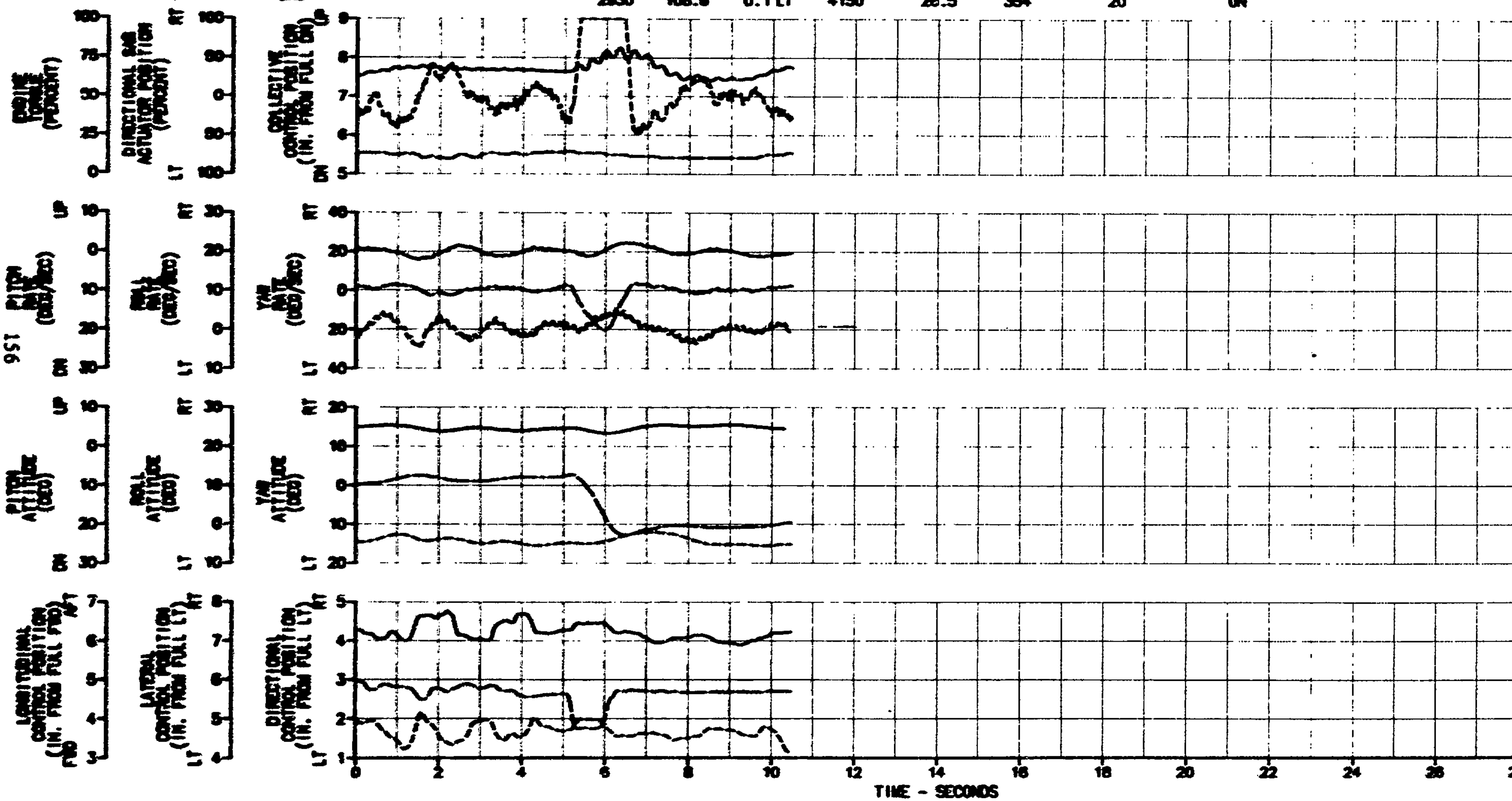


FIGURE E-121
LEFT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

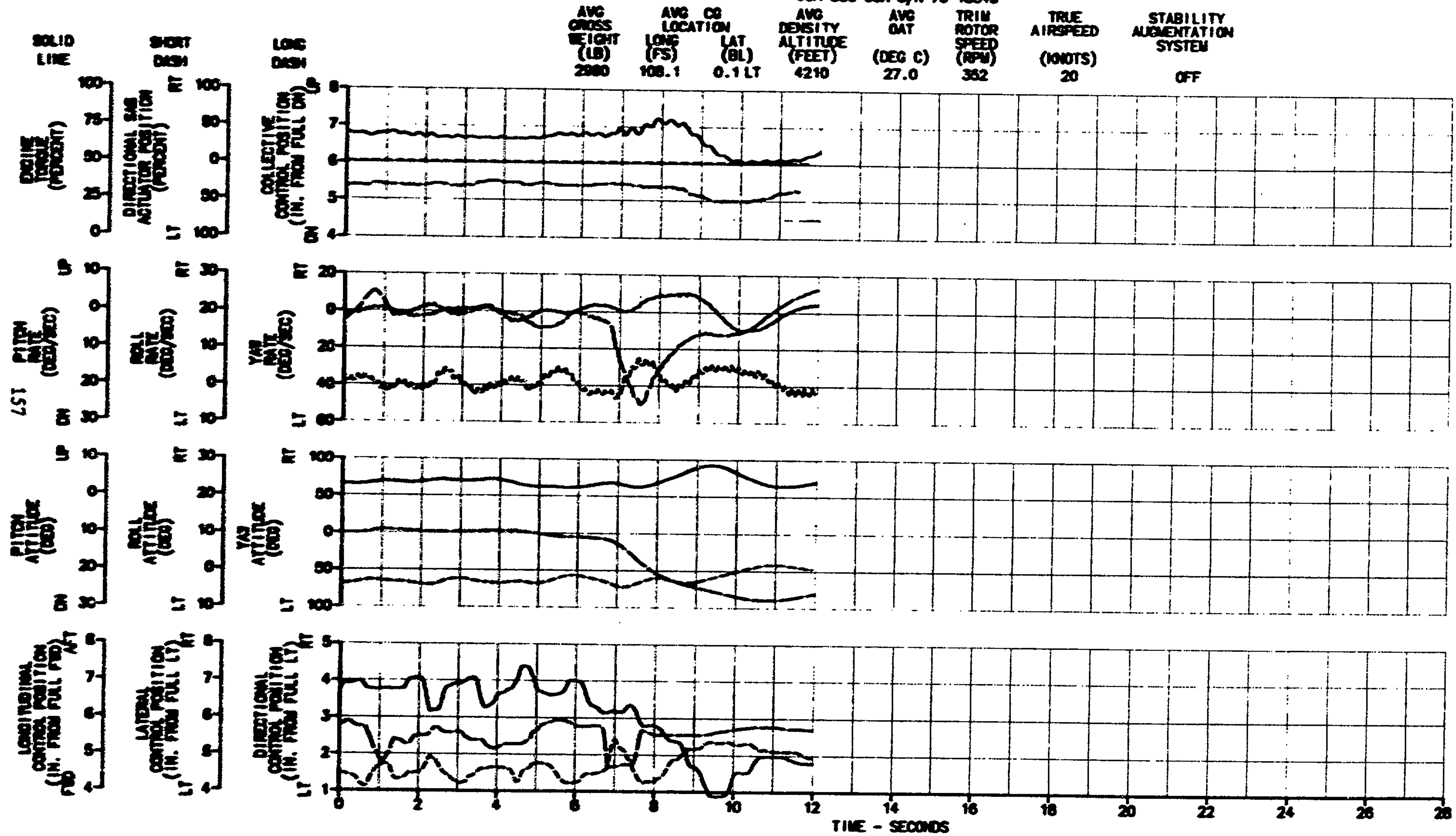


FIGURE E-122

RIGHT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH

JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	106.6	0.1 LT	4870	26.0	352	20	ON

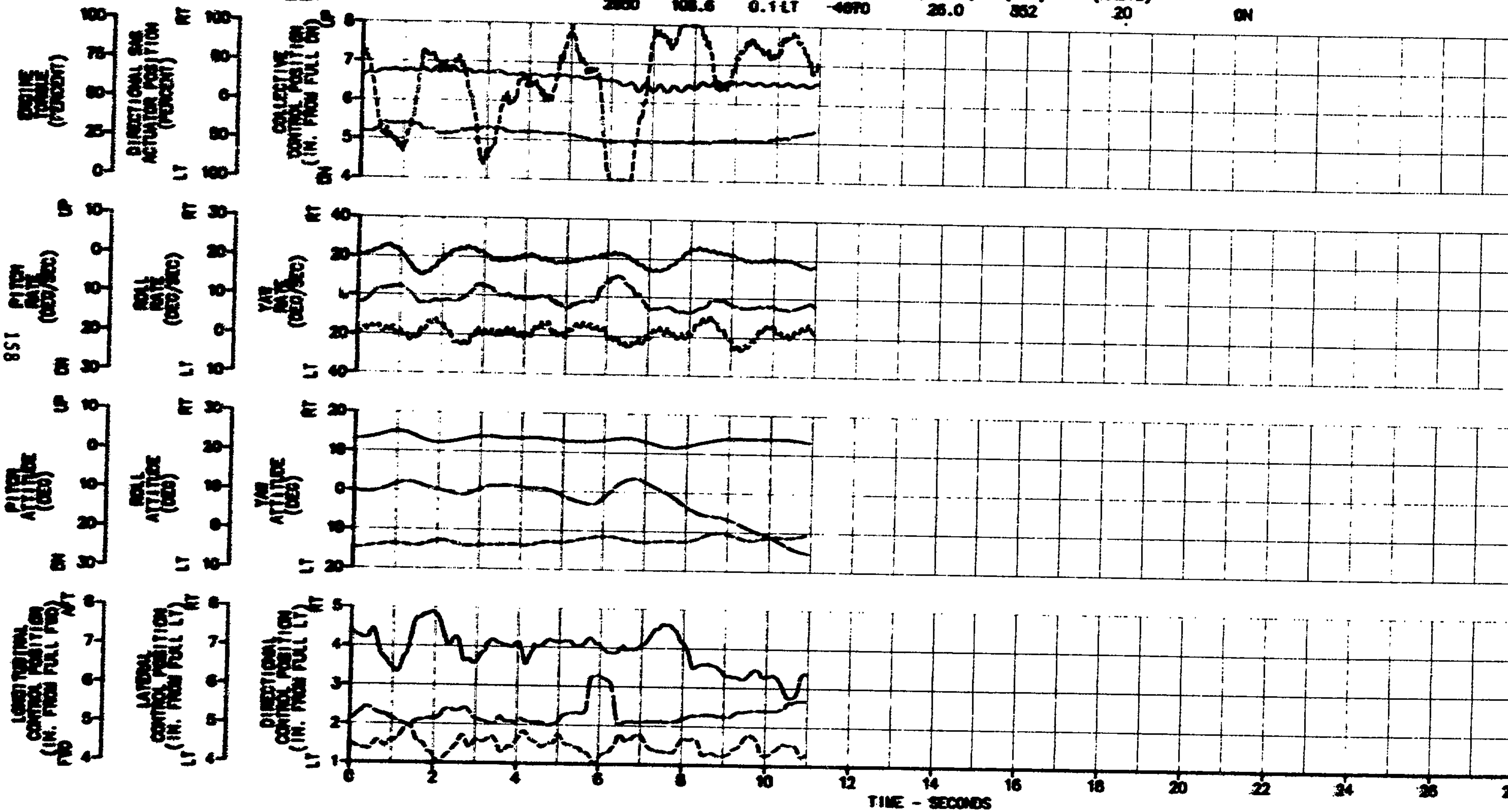


FIGURE E-123
RIGHT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2900	106.1	0.1 LT	4130	26.5	359	20	OFF

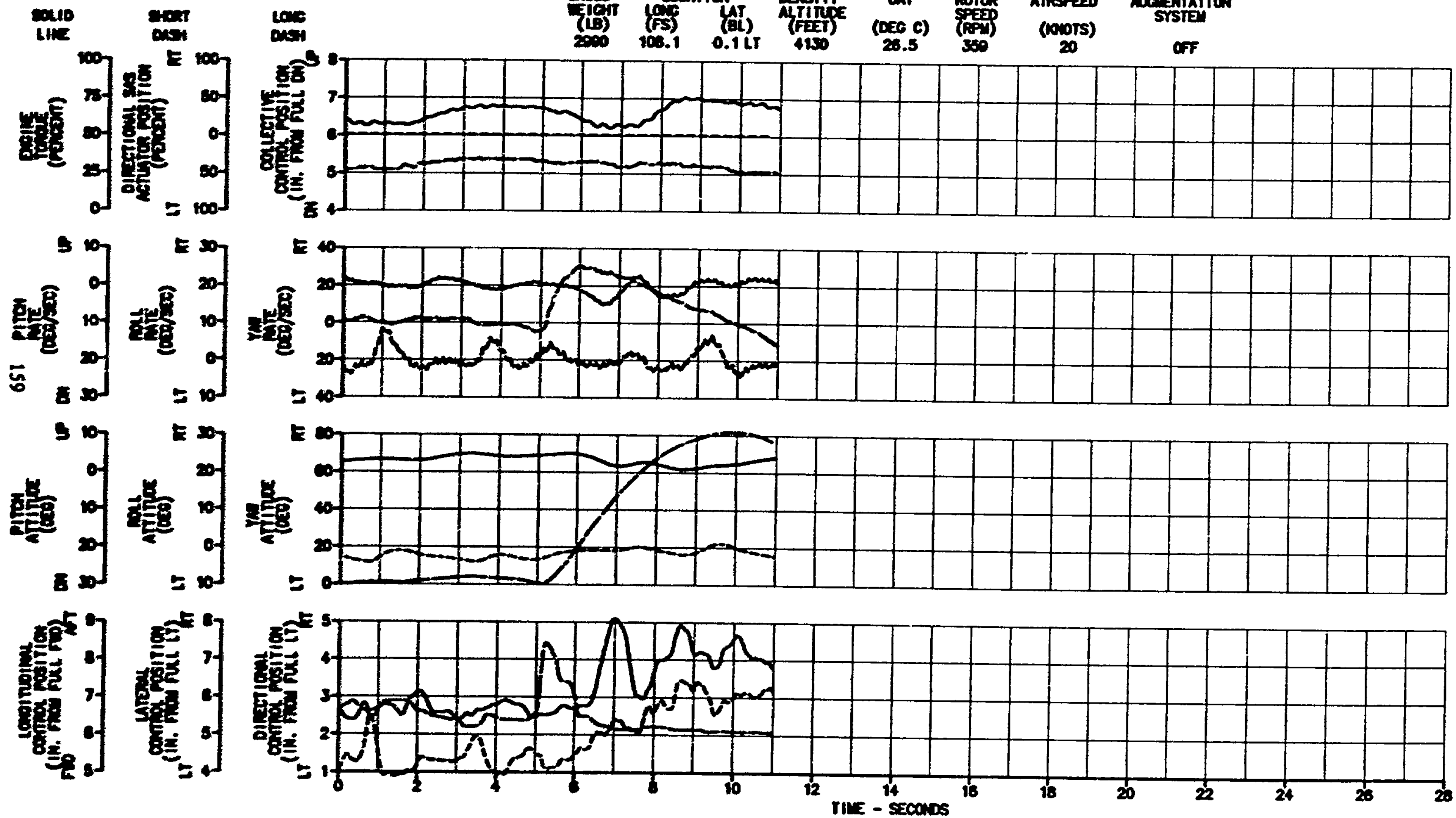


FIGURE E-124
LEFT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH

JOH-58D USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2980	108.1	0.1 LT	4100	26.0	353	30	ON

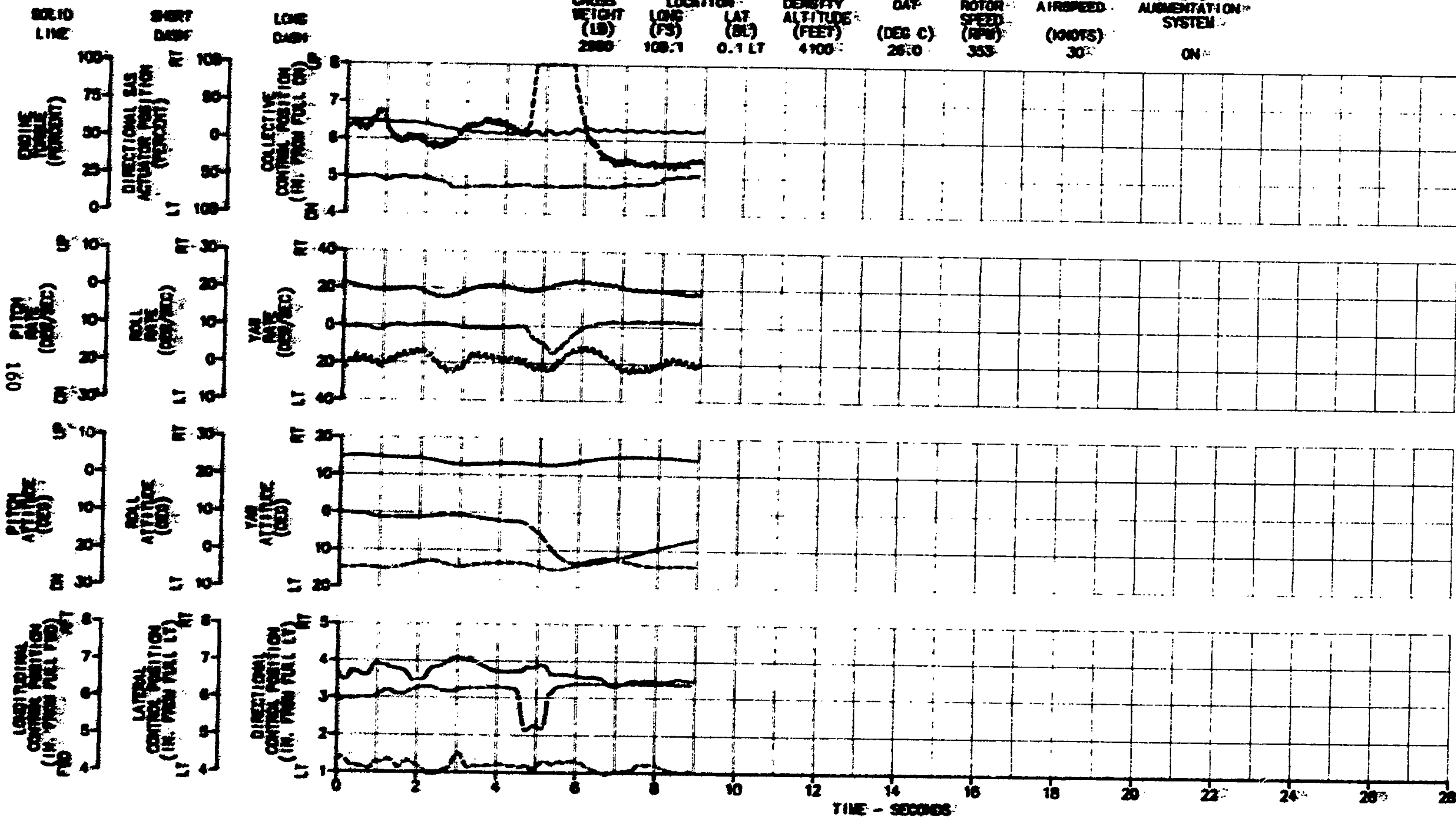


FIGURE E-125
LEFT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

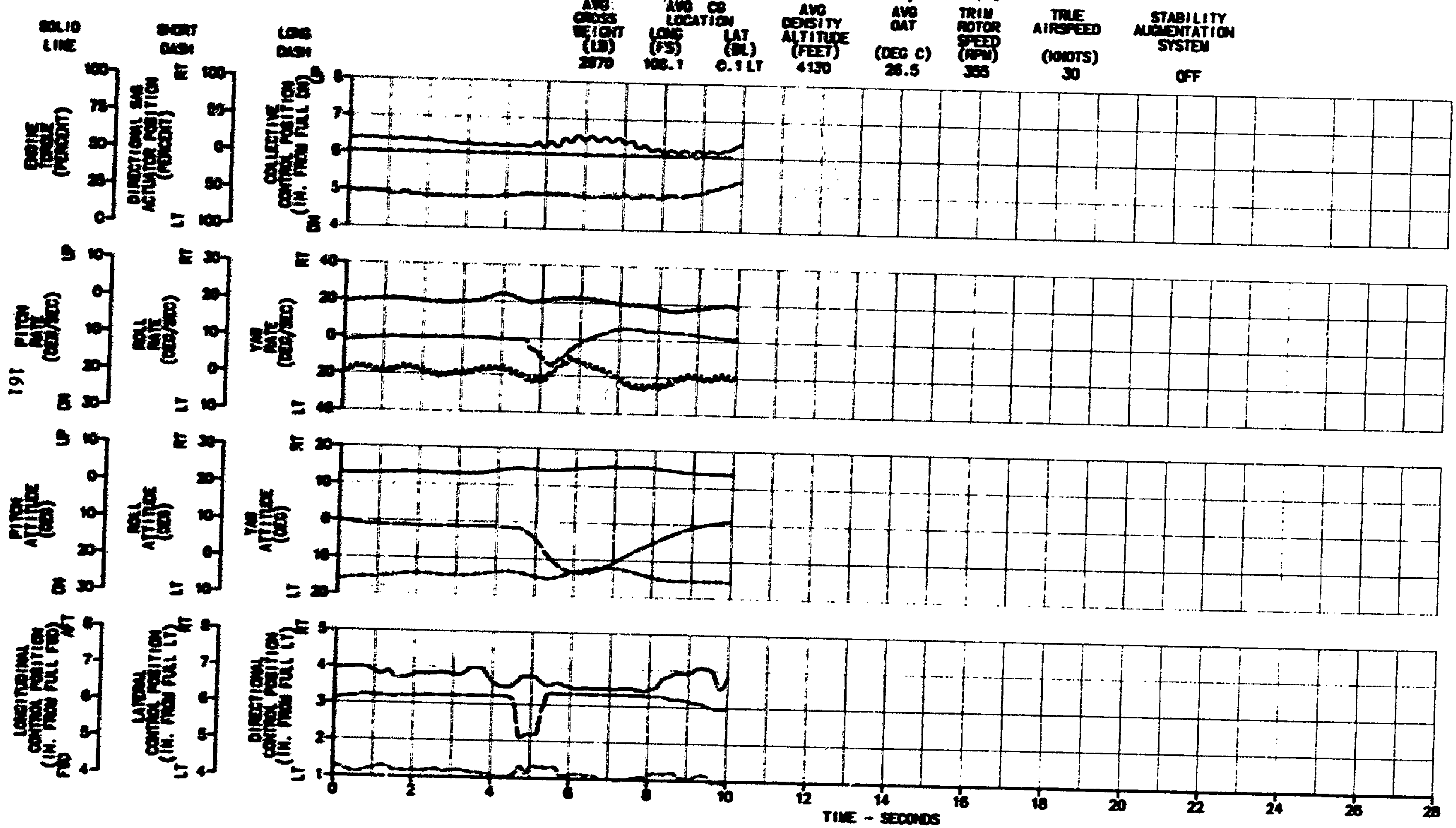


FIGURE E-126
RIGHT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

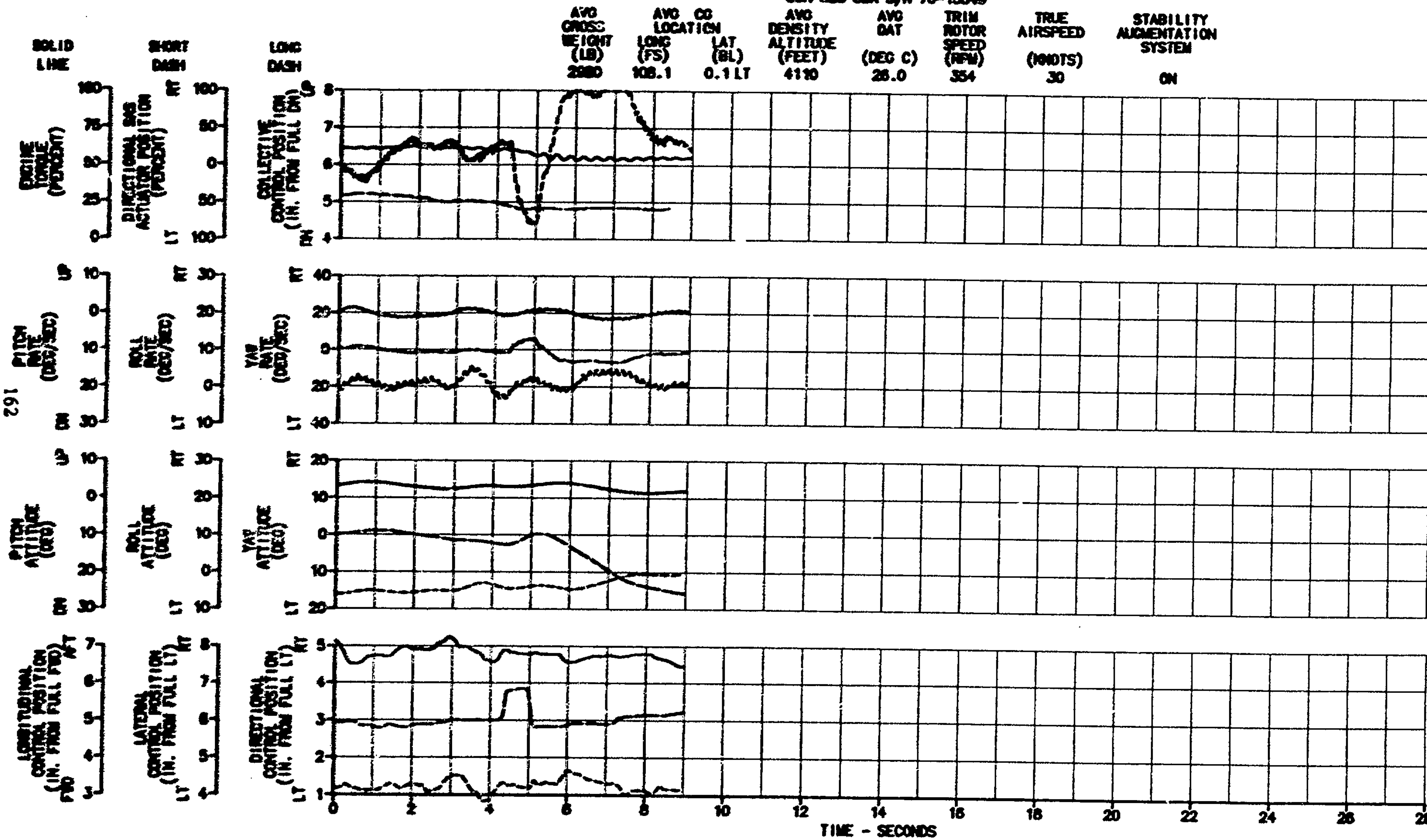


FIGURE E-127
RIGHT DIRECTIONAL PULSE INPUT - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	108.0	0.1 LT	4140	26.5	355	30	OFF

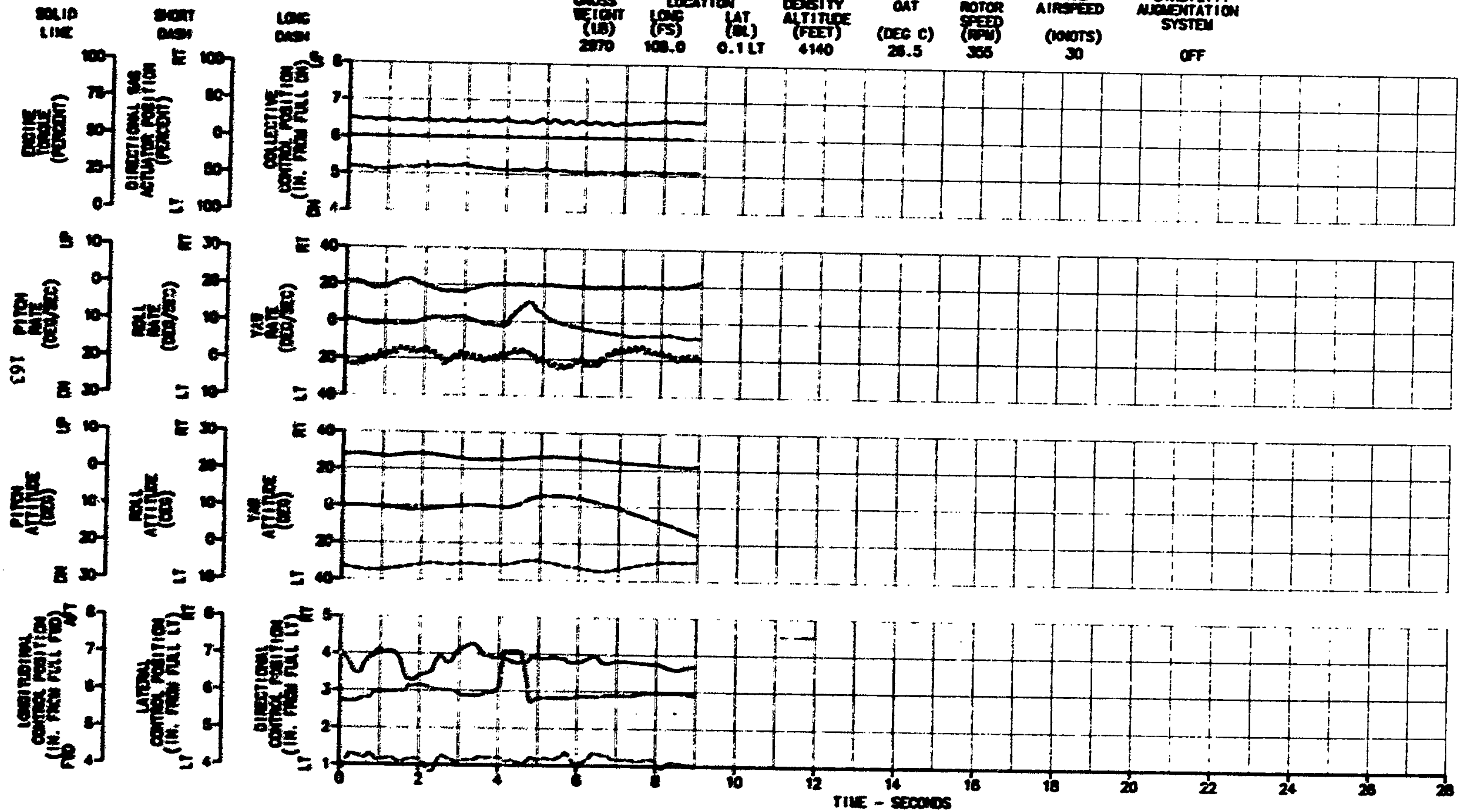


FIGURE E-128
DIRECTIONAL DOUBLET
JOH-58C USA S/N 70-15340

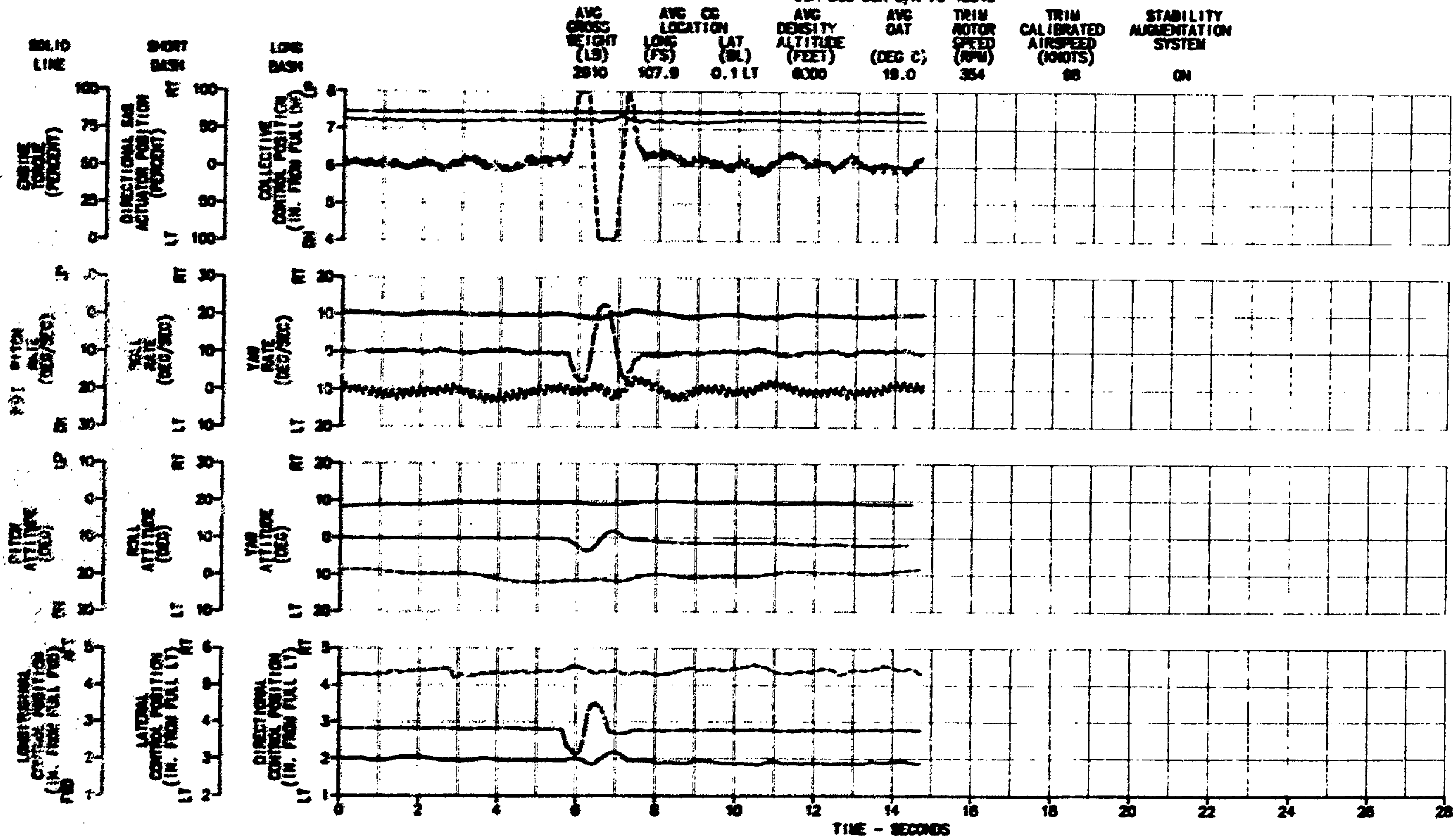


FIGURE E-129
DIRECTIONAL DOUBLET
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
[illegible]	107.9	0.1 LT	5820	19.5	354	89	OFF

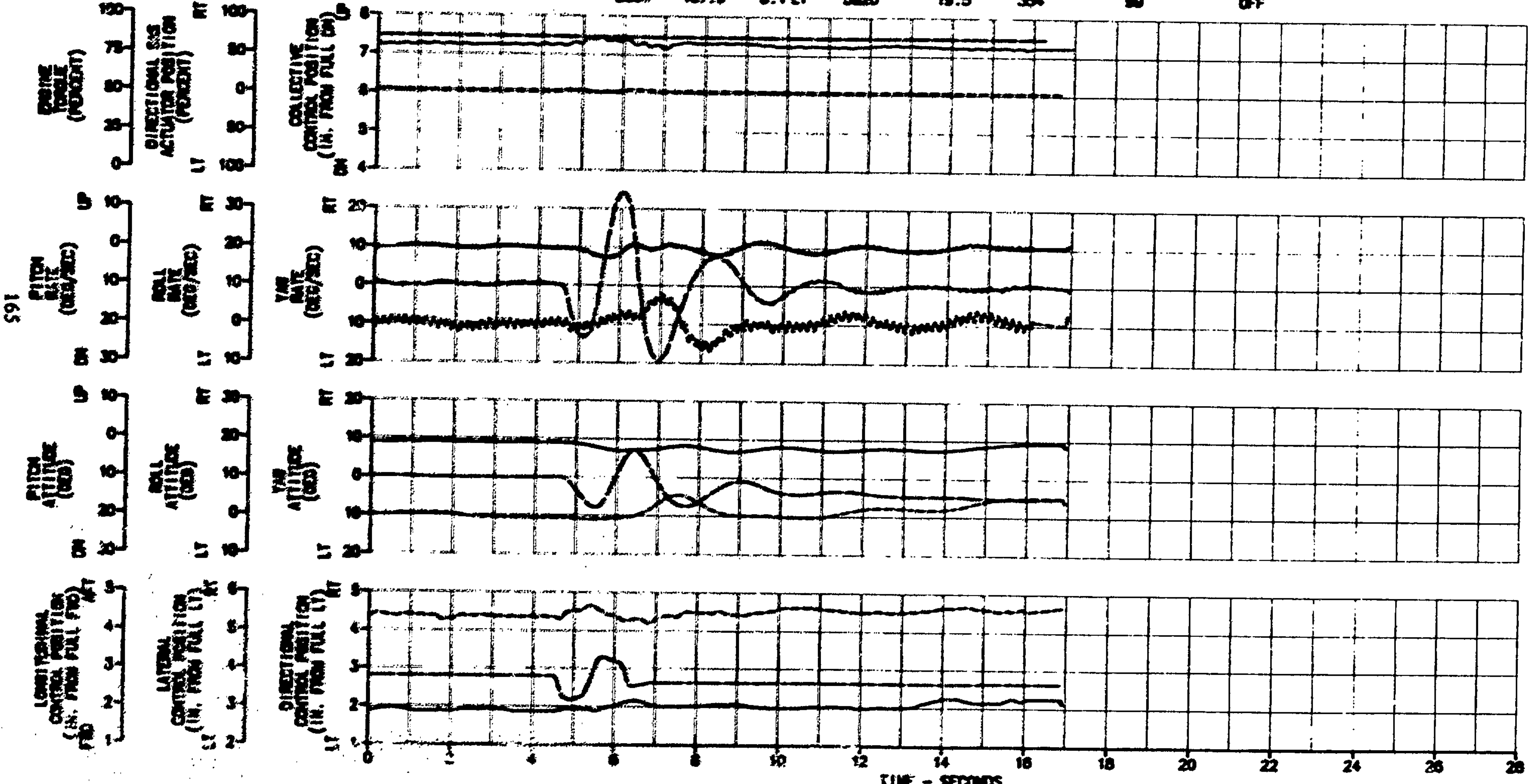


FIGURE E-130
DIRECTIONAL DOUBLET
JOH-58C USA S/N 70-15349

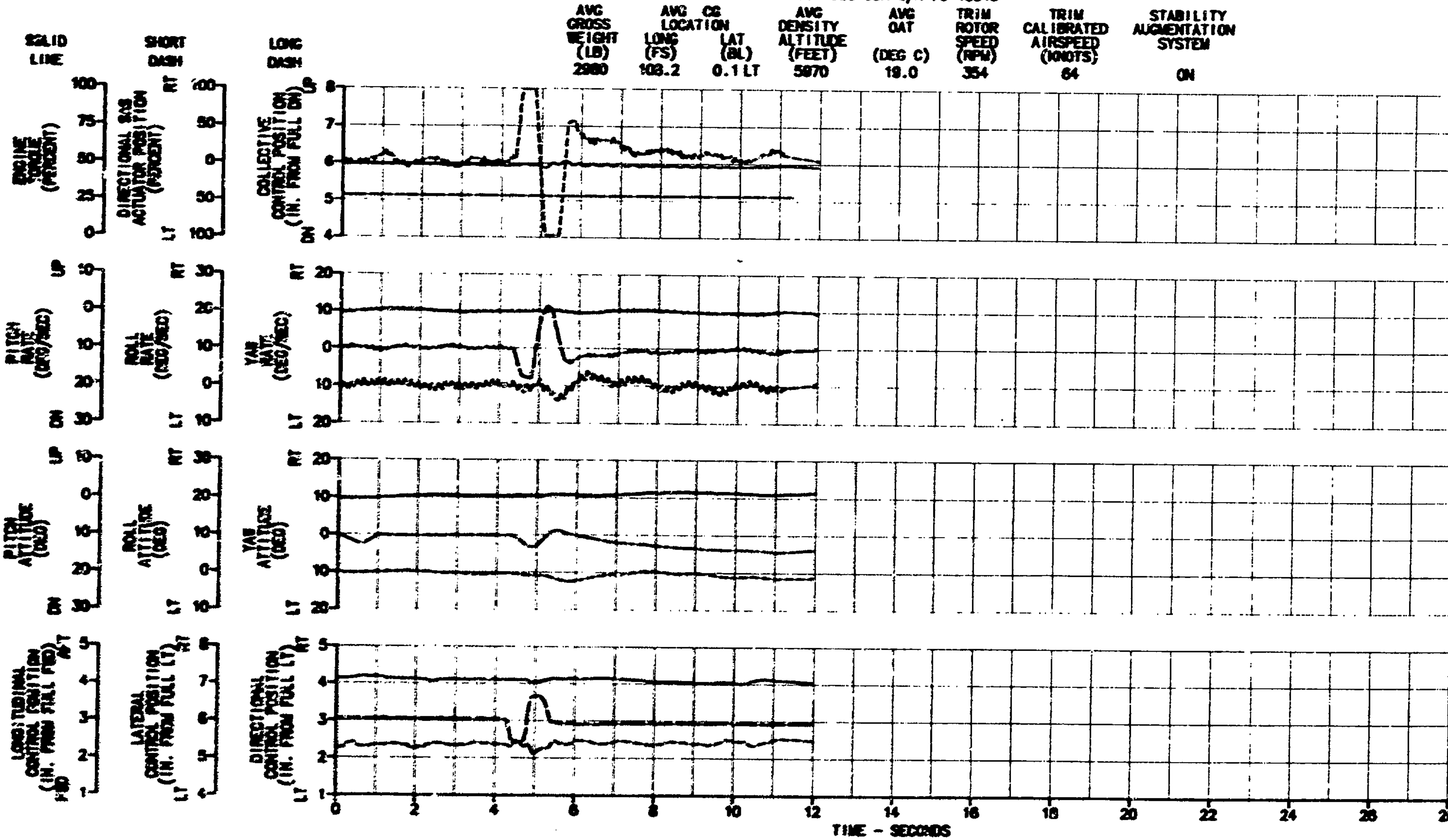


FIGURE E-131
DIRECTIONAL DOUBLET
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2940	108.0	0.1 LT	5850	18.5	354	62	OFF

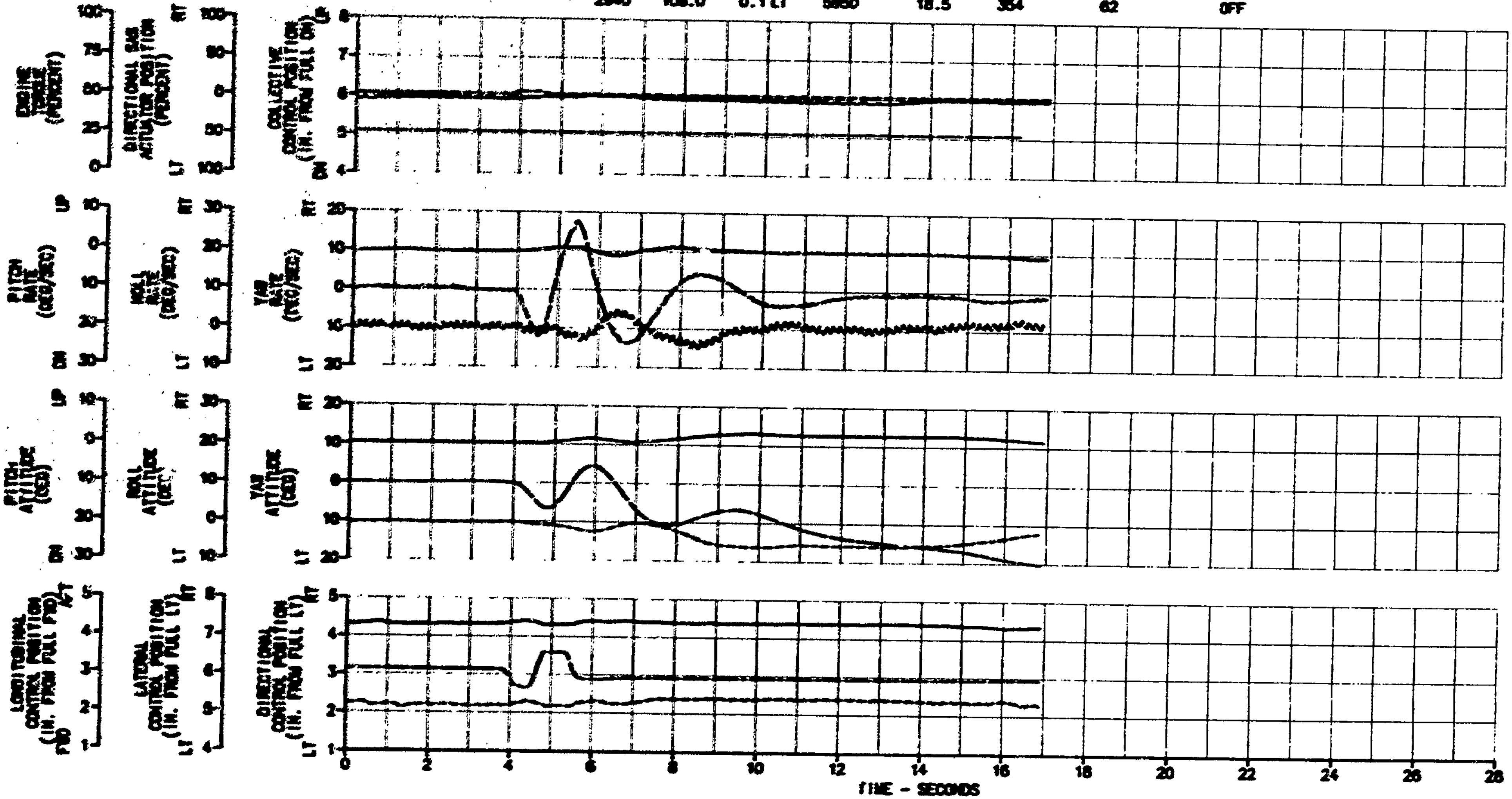


FIGURE E-132
RELEASE FROM LEFT SIDESLIP
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2910	107.9	0.1 LT	5820	19.0	354	90	ON

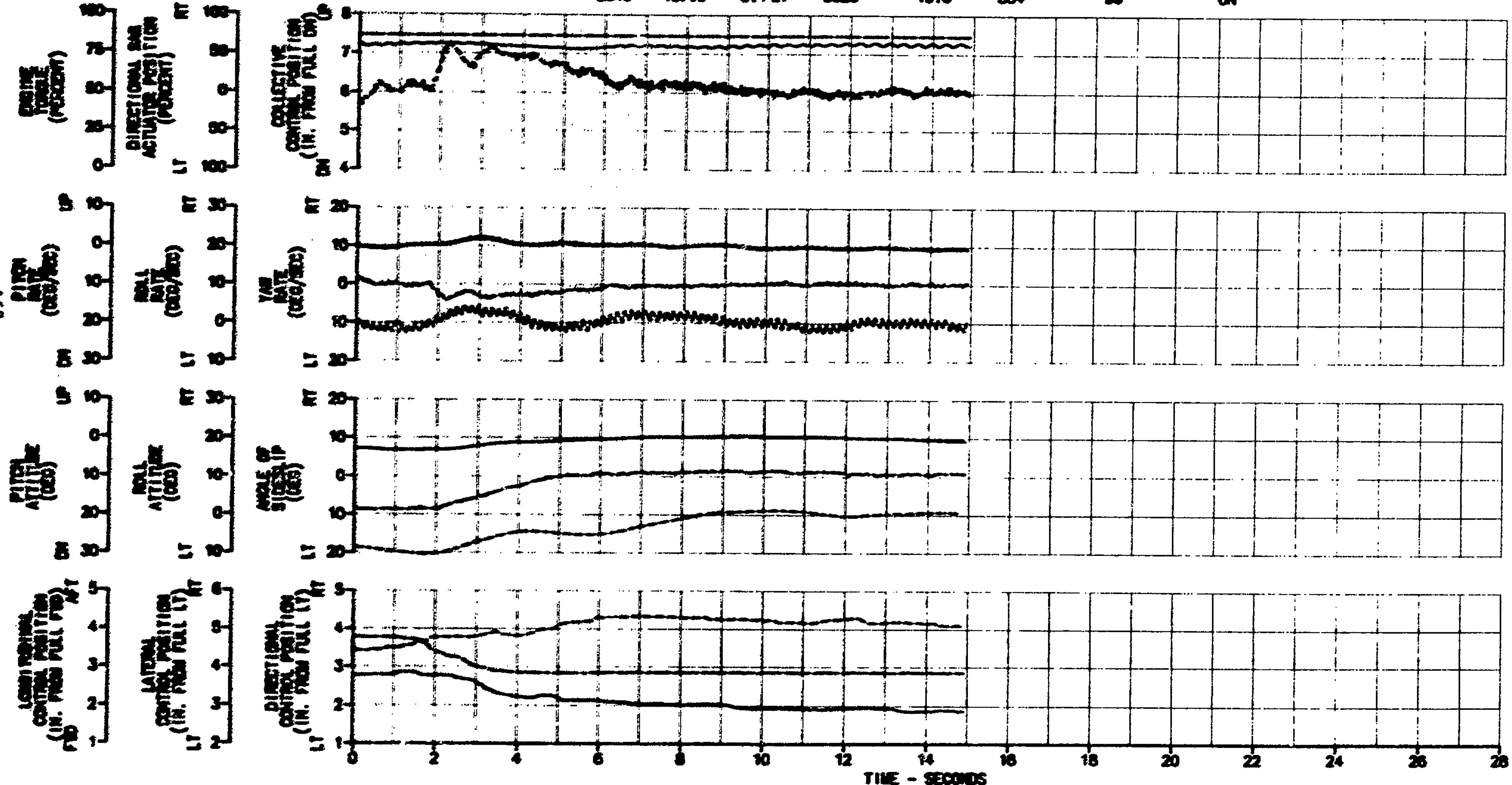


FIGURE E-133
RELEASE FROM LEFT SIDESLIP
JOH-58C USA S/N 70-15349

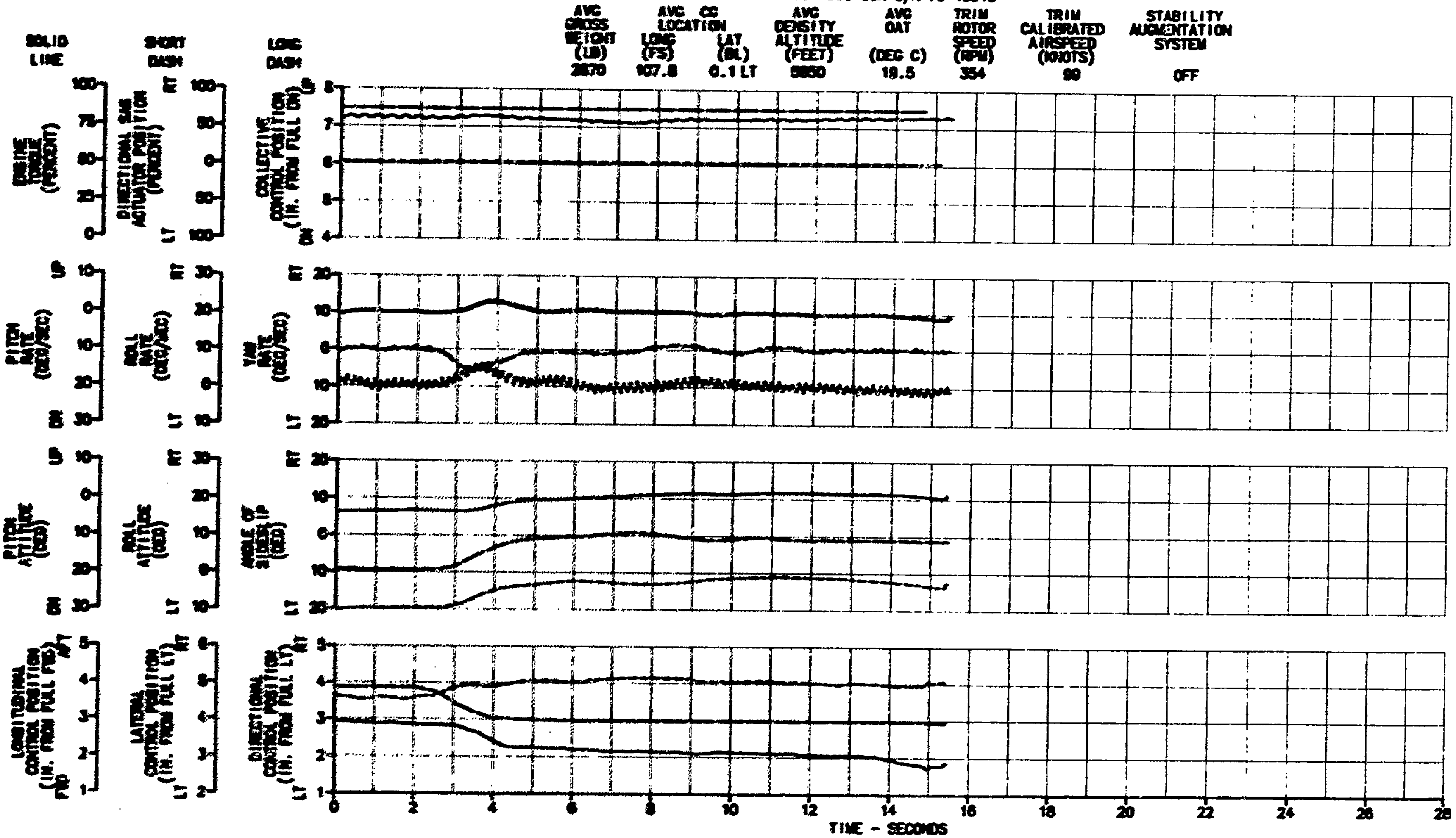


FIGURE E-134
RELEASE FROM RIGHT SIDESLIP
JOH-58C USA S/N 70-15340

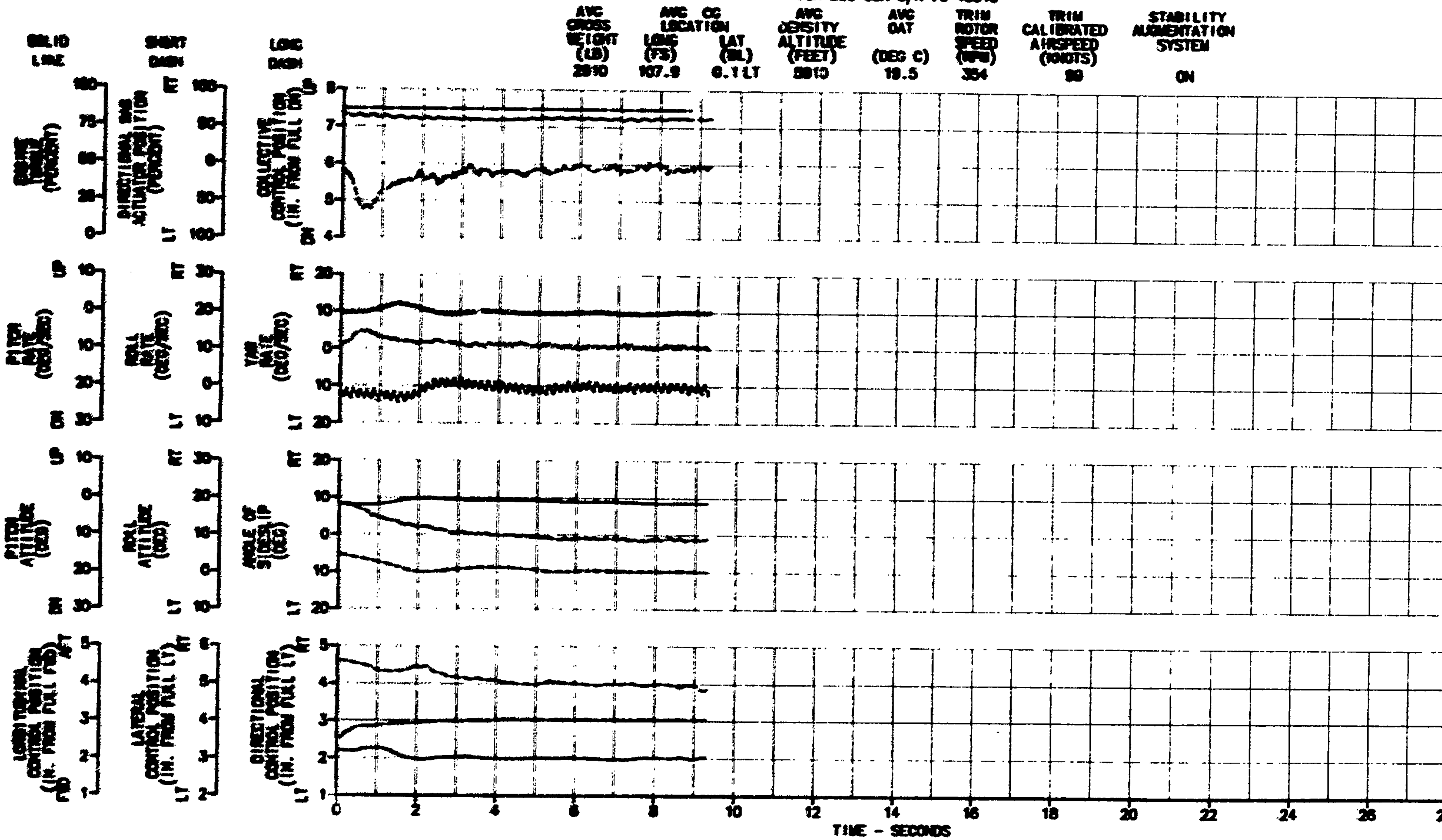


FIGURE E-135
RELEASE FROM RIGHT SIDESLIP
JOH-58C USA S/N 70-15349

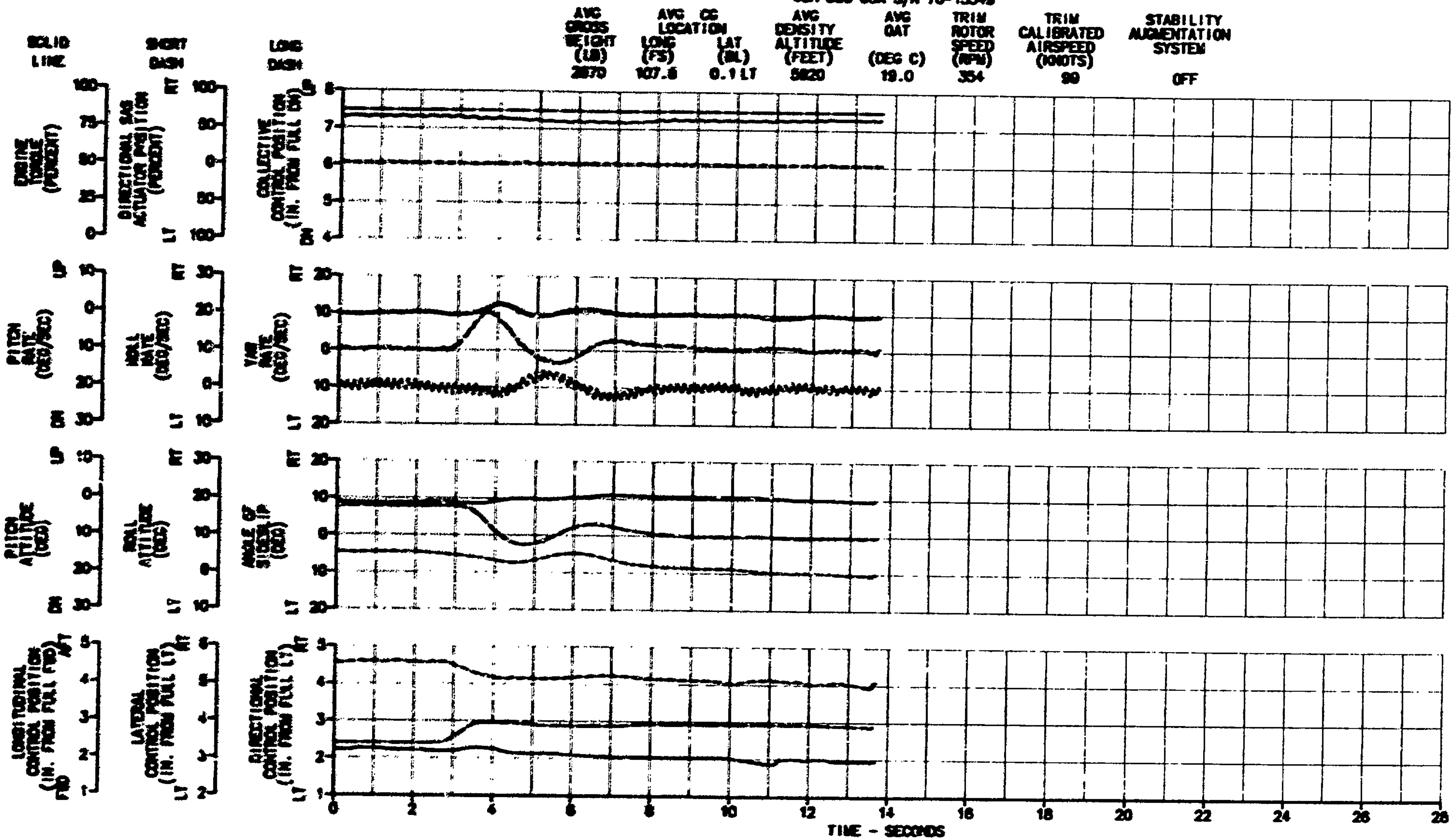


FIGURE E-136
RELEASE FROM LEFT SIDESLIP
JOH-58C USA S/N 70-15340

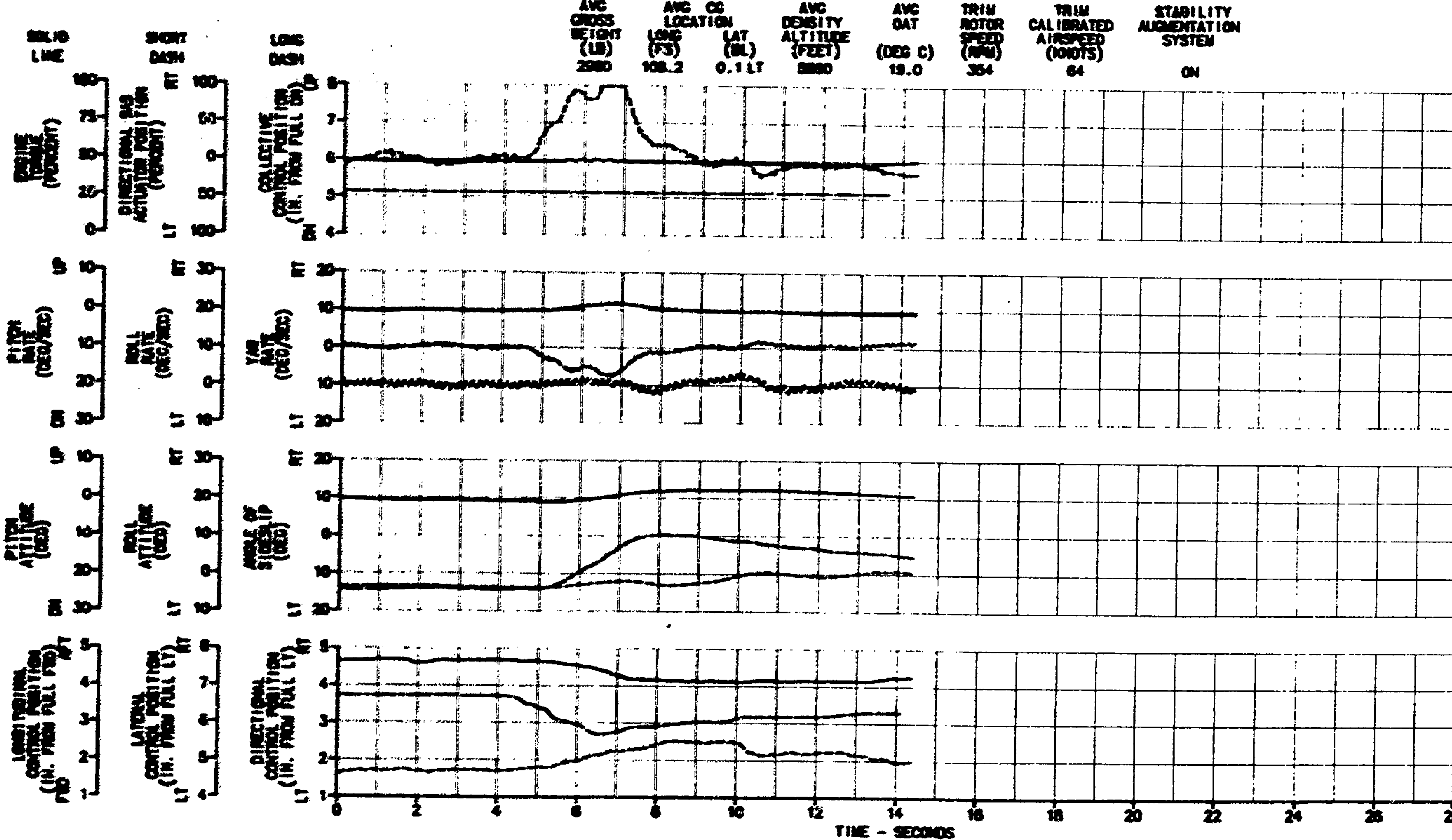


FIGURE E-137
RELEASE FROM LEFT SIDESLIP
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2940	108.0	0.1 LT	6060	18.5	353	60	OFF

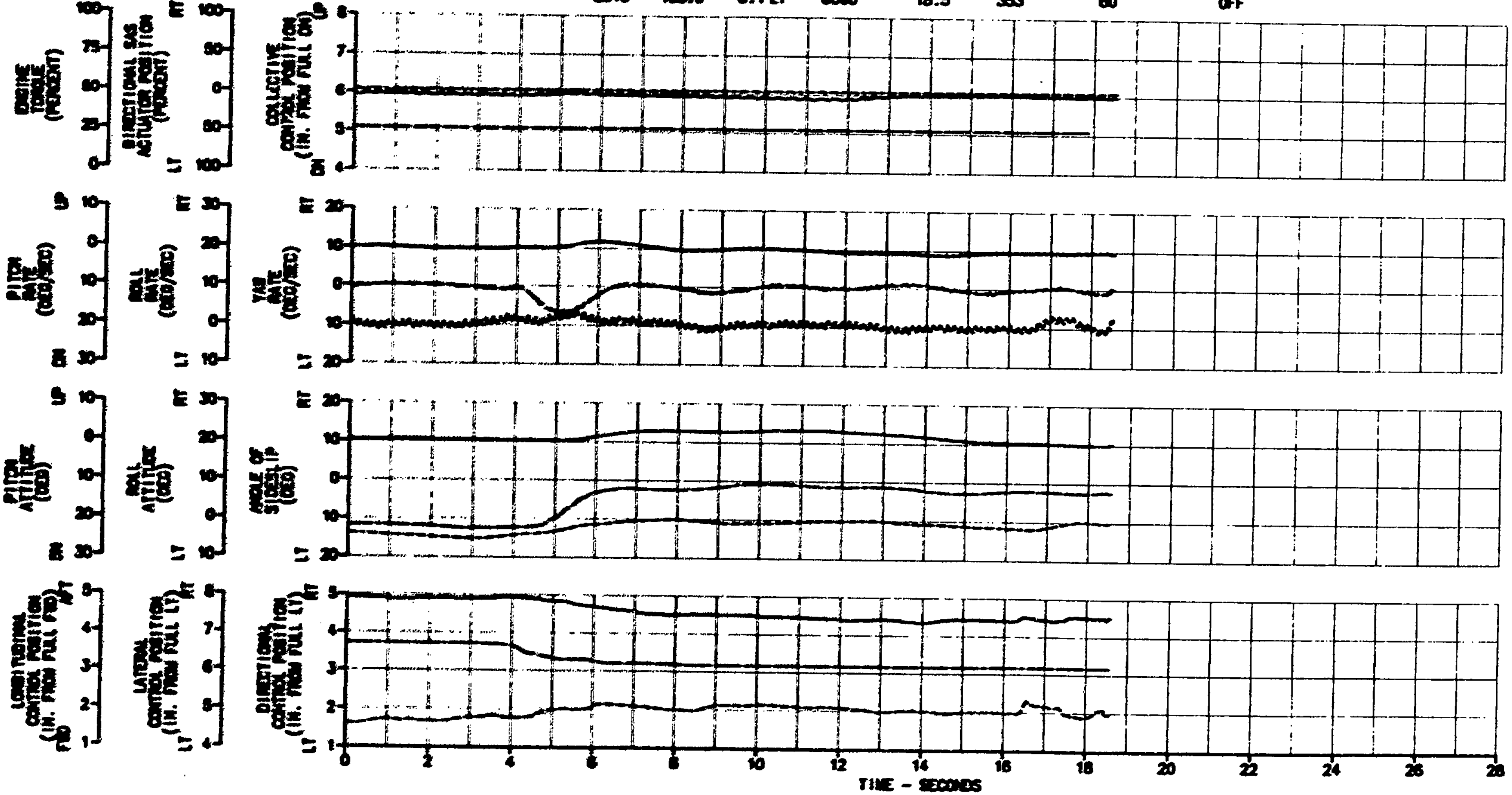


FIGURE E-138
RELEASE FROM RIGHT SIDESLIP
JOH-58C USA S/N 70-15340

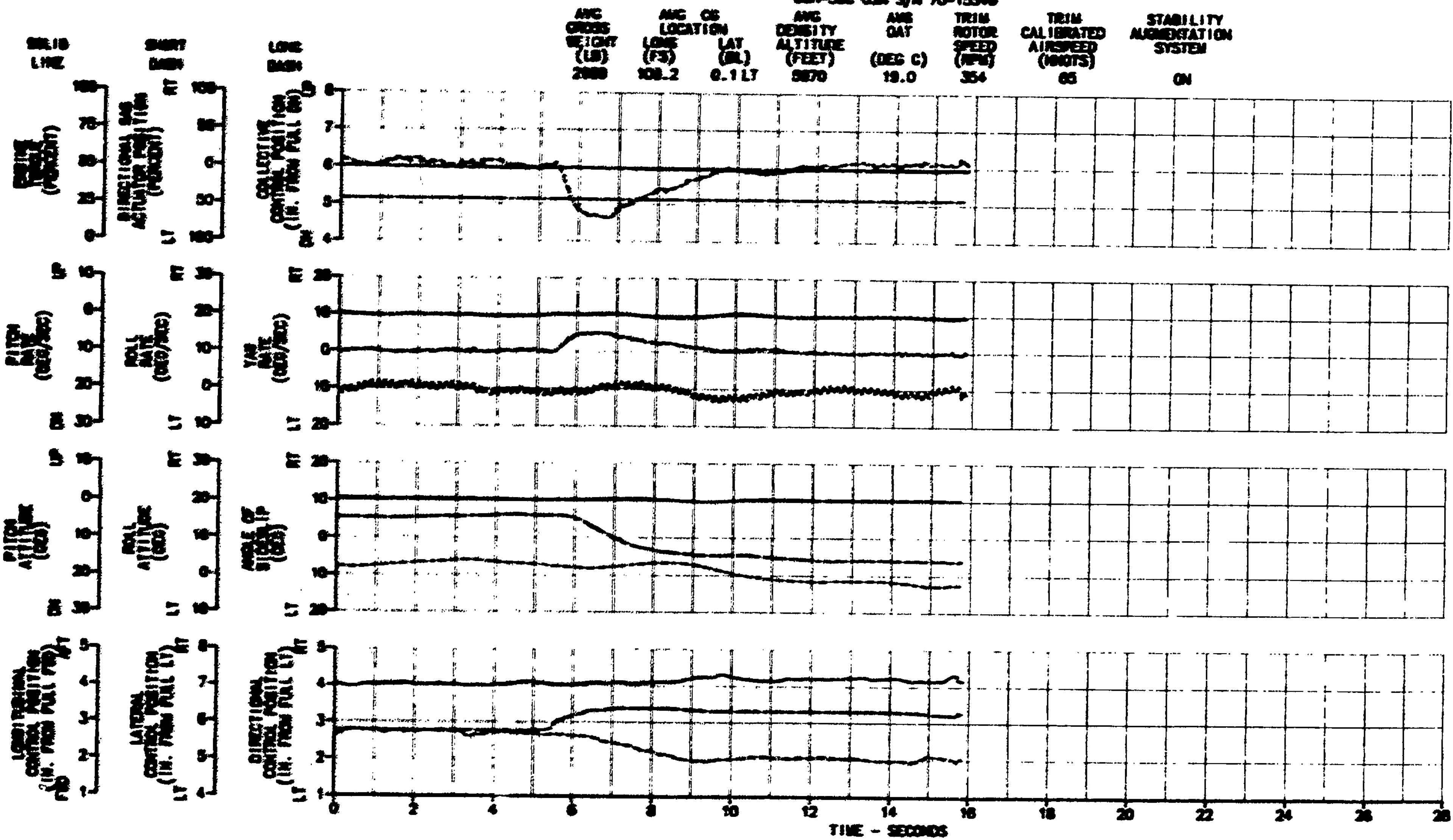


FIGURE E-139
RELEASE FROM RIGHT SIDESLIP
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2840	106.0	0.1 LT	6100	18.5	354	62	OFF

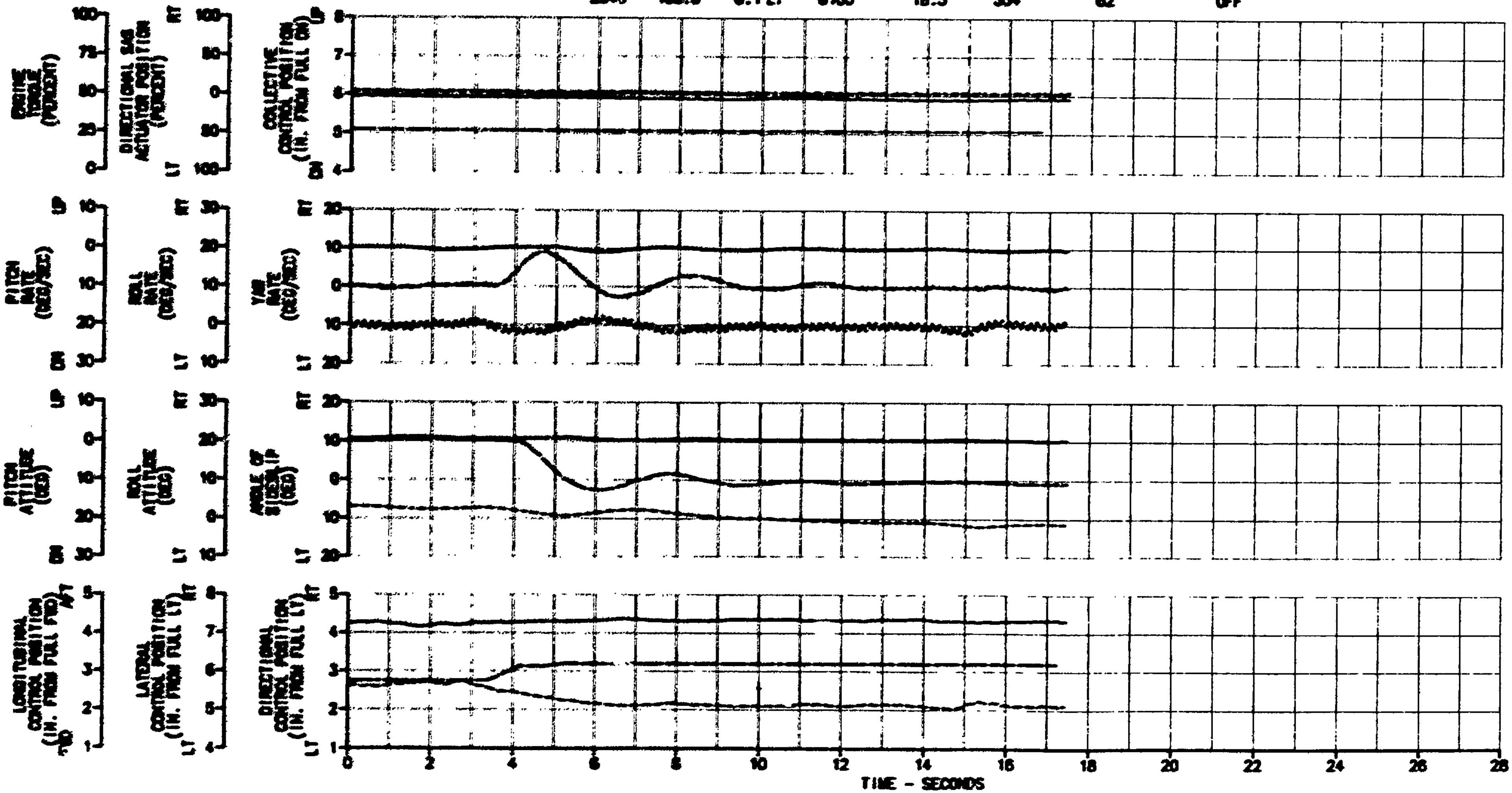


FIGURE E-140
SPIRAL STABILITY
JOH-58C USA S/N 70-15340

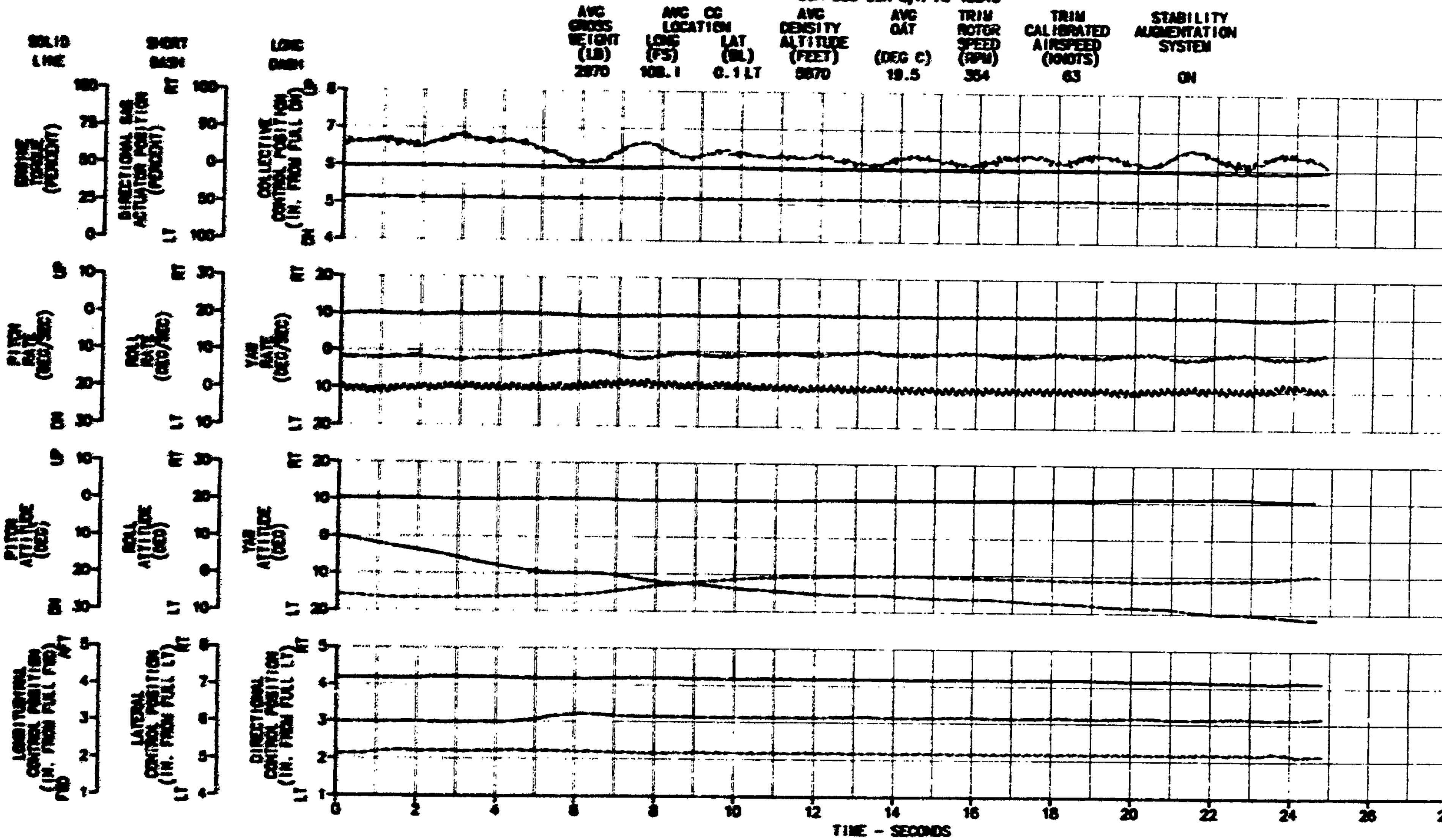


FIGURE E-141
SPIRAL STABILITY
JOH-58C USA S/N 70-15349

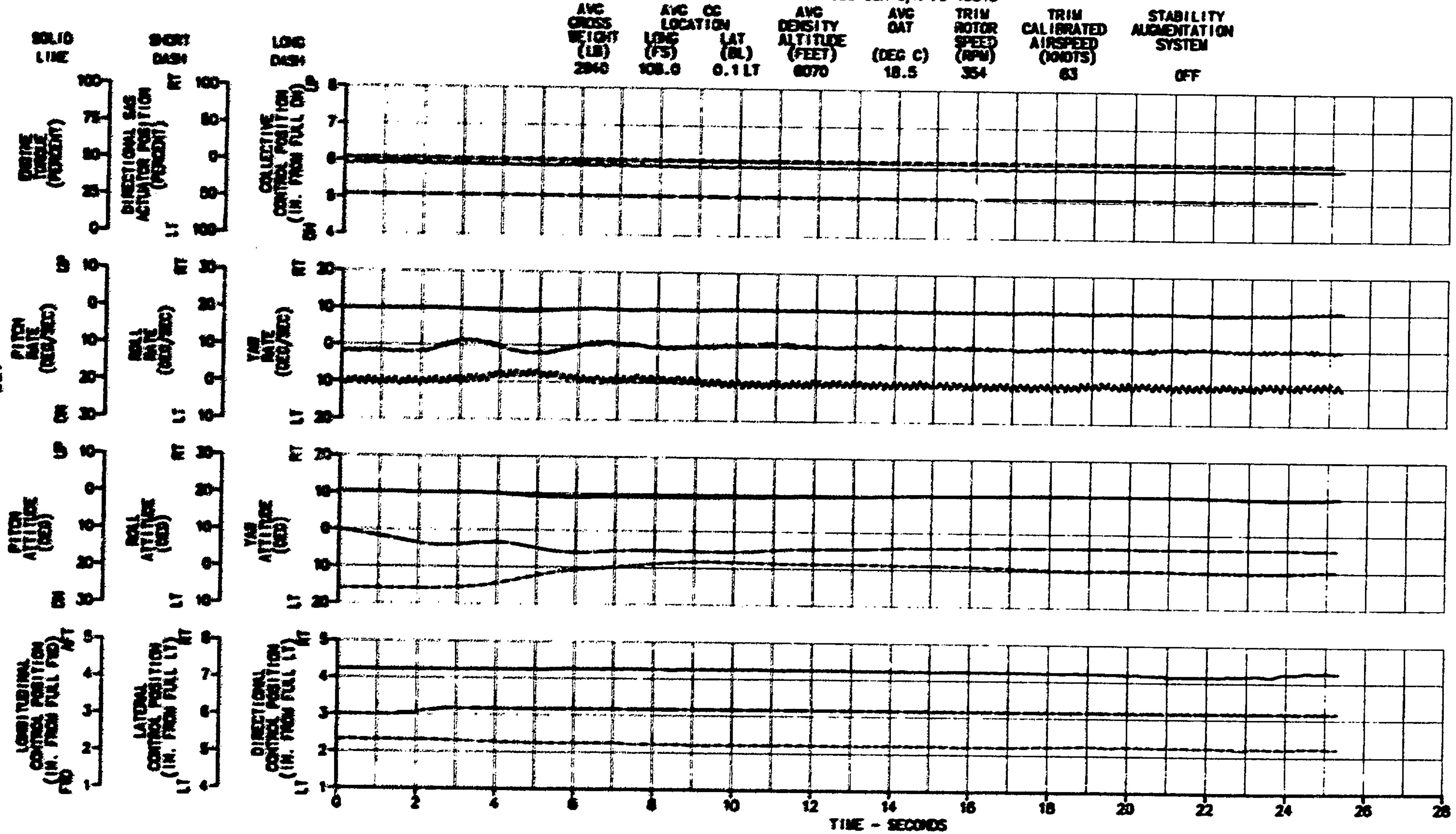


FIGURE E-142
SPIRAL STABILITY
JOH-58C USA S/N 70-15249

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2970	108.:	0.1 LT	5880	19.5	354	67	ON

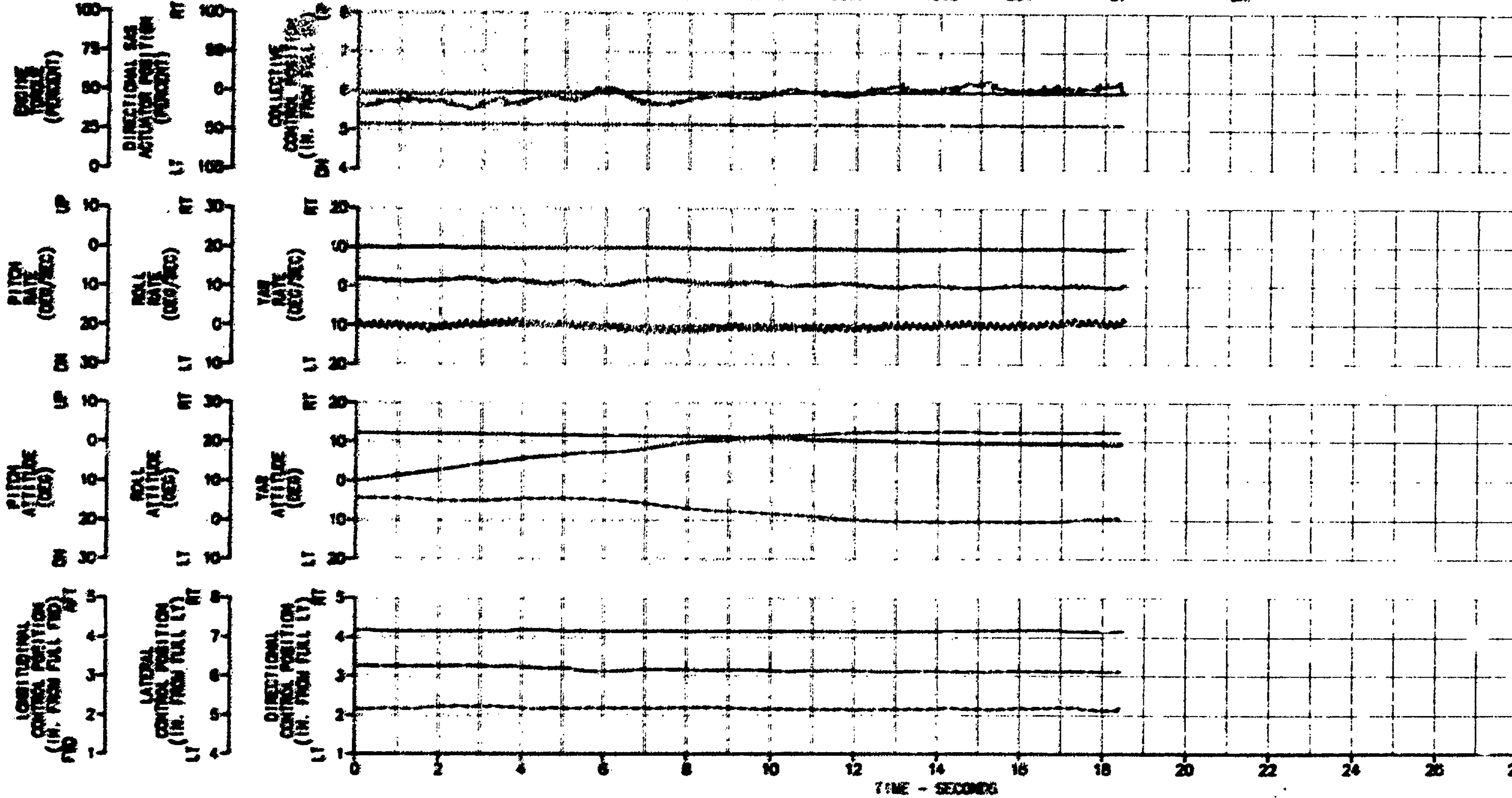


FIGURE E-143
SPIRAL STABILITY
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2840	108.0	-0.1 LT	6050	19.0	354	64	OFF

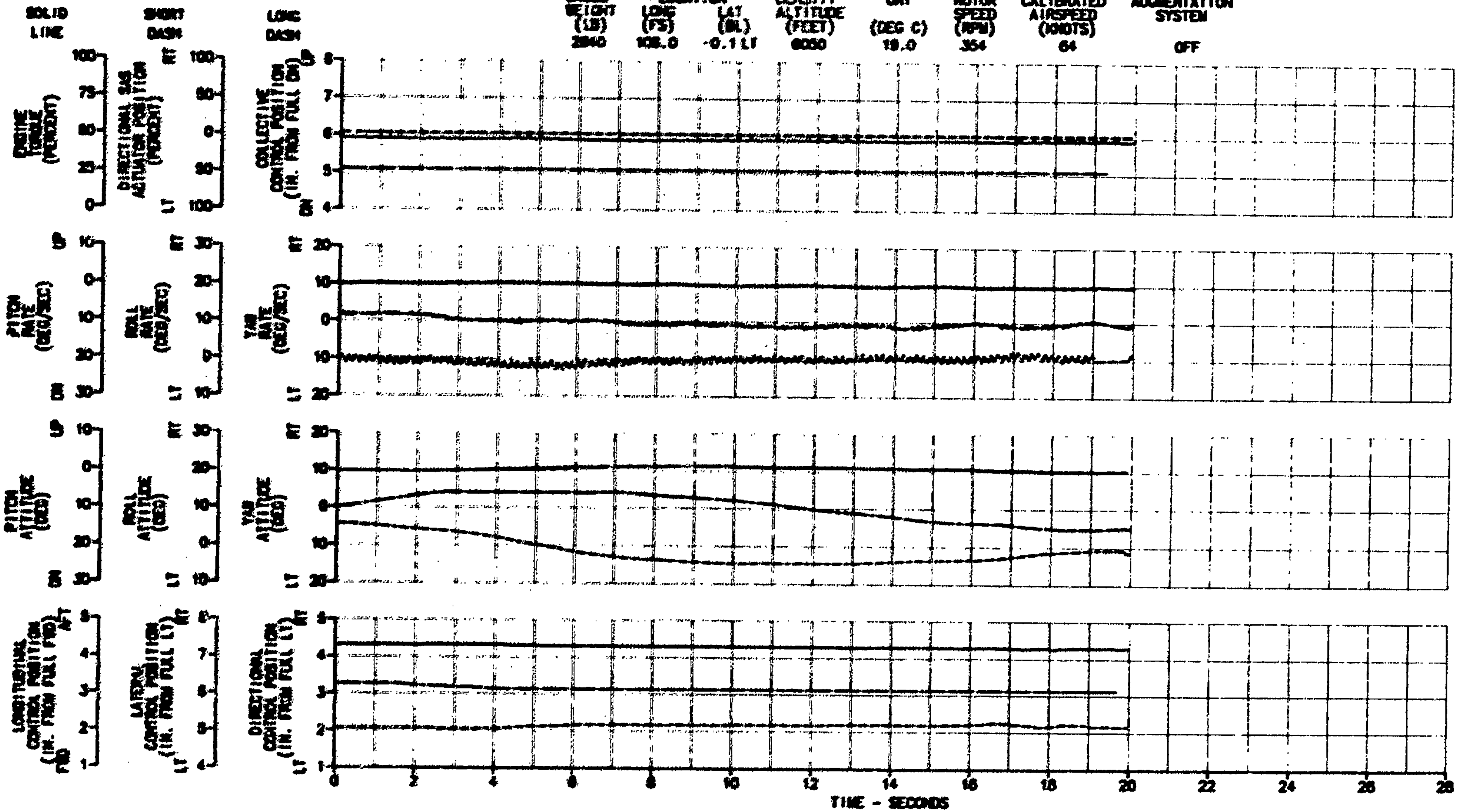


FIGURE E-144
SPIRAL STABILITY
JOH-58C USA S/N 70-15349

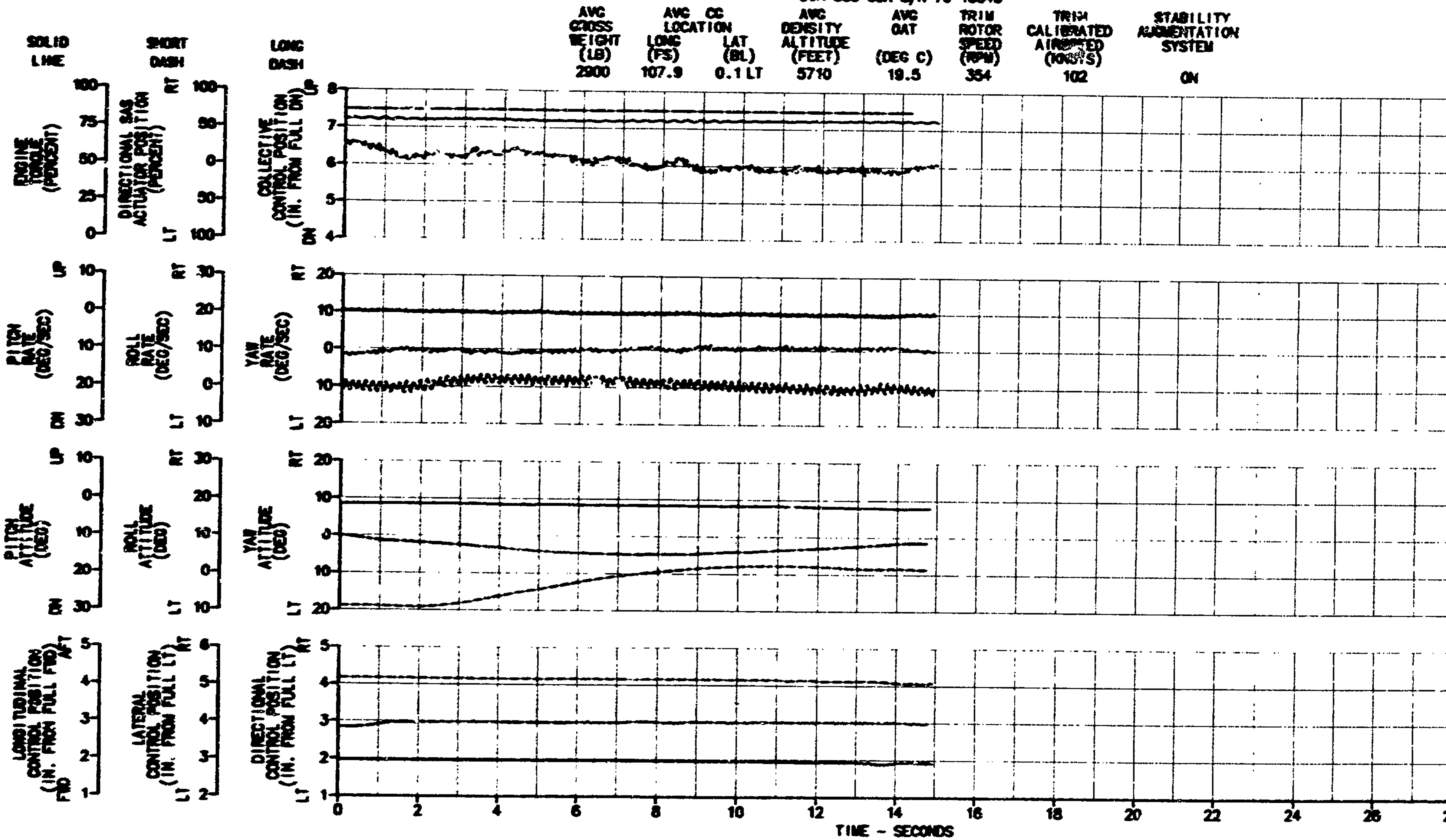


FIGURE E-145
SPIRAL STABILITY
JOH-58C USA S/N 70-15349

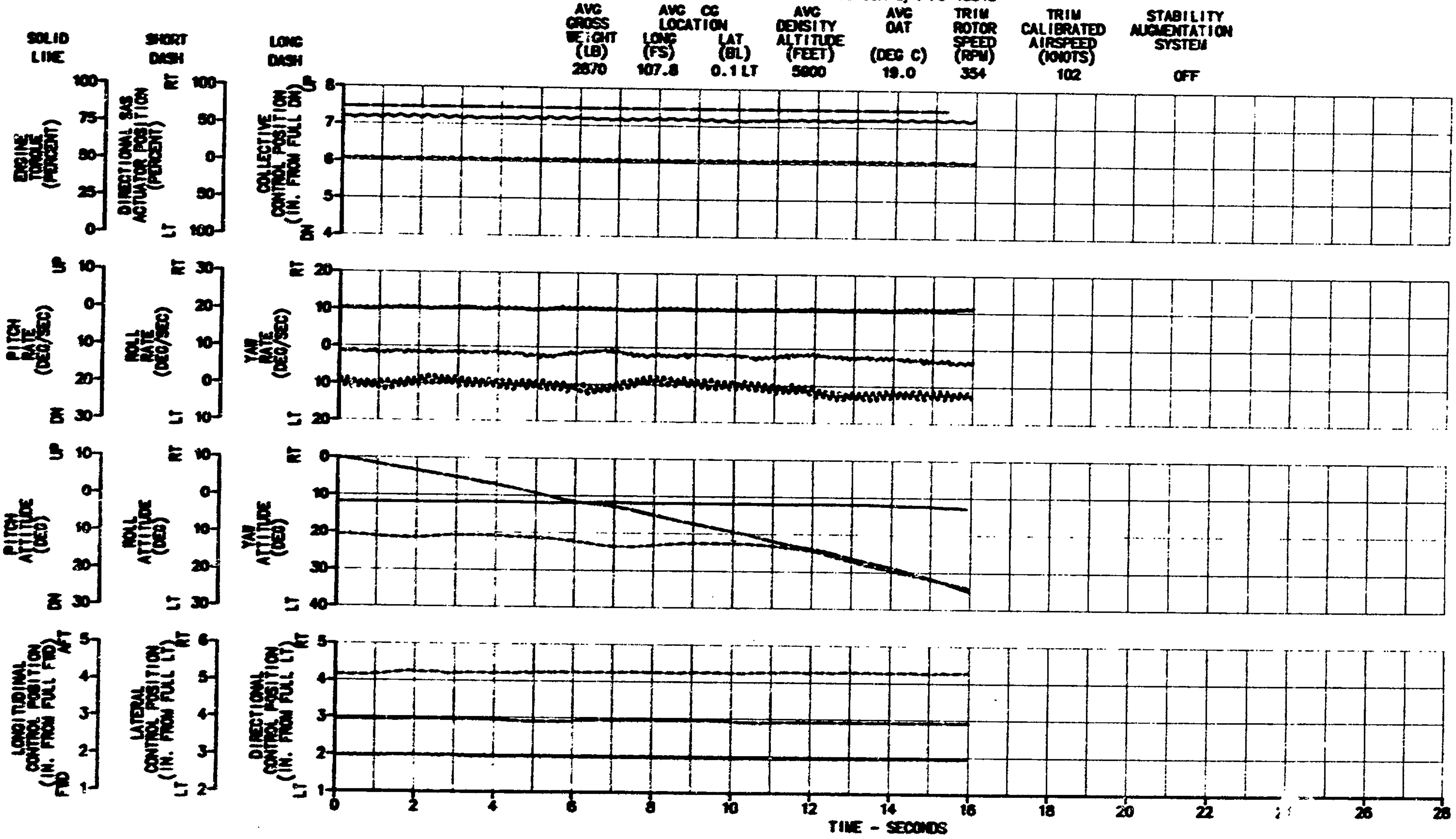


FIGURE E-146
SPIRAL STABILITY
JOH-58C USA S/N 70-15349

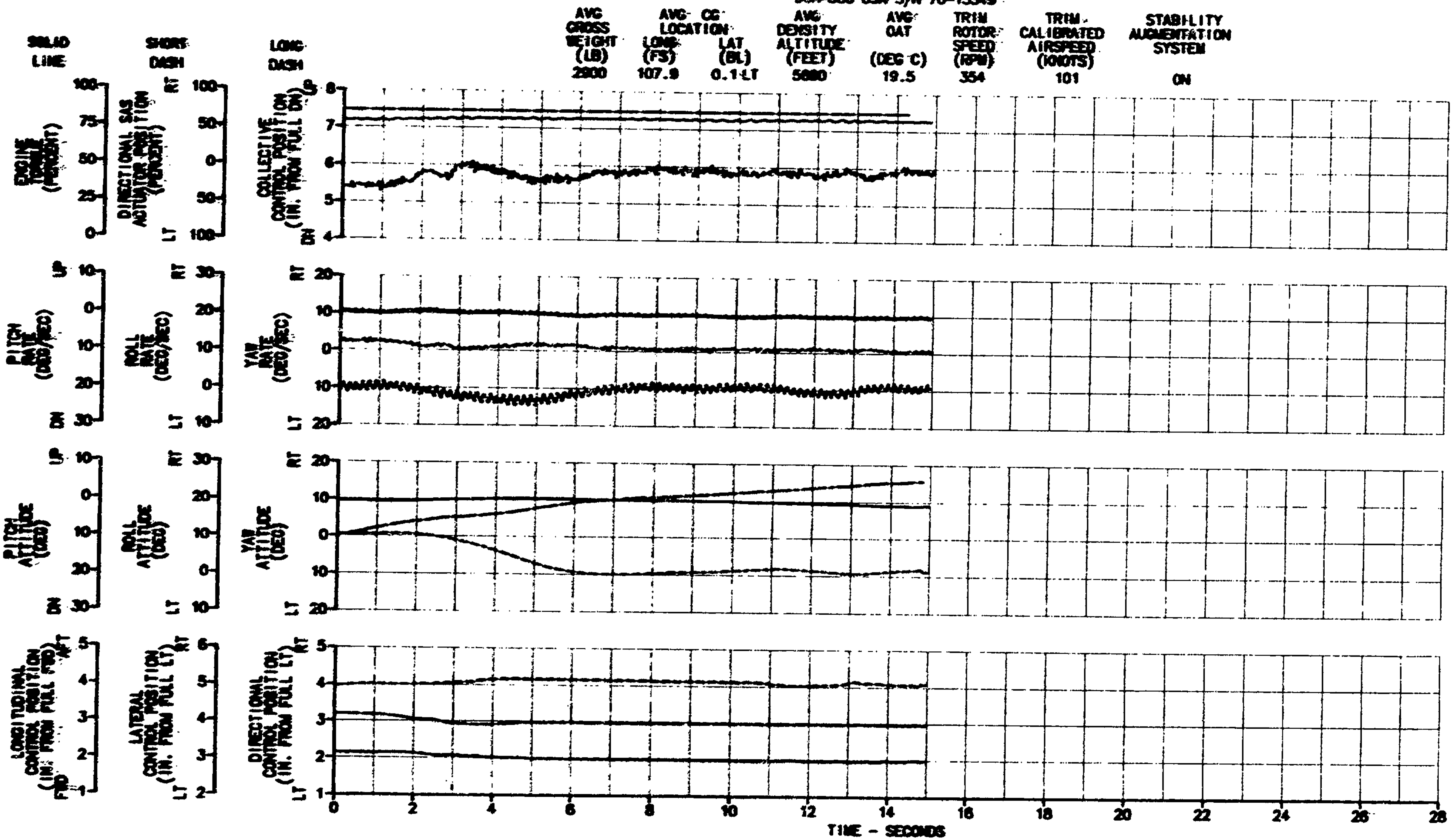


FIGURE E-147
SPIRAL STABILITY
JOH-58C USA S/N 70-15349

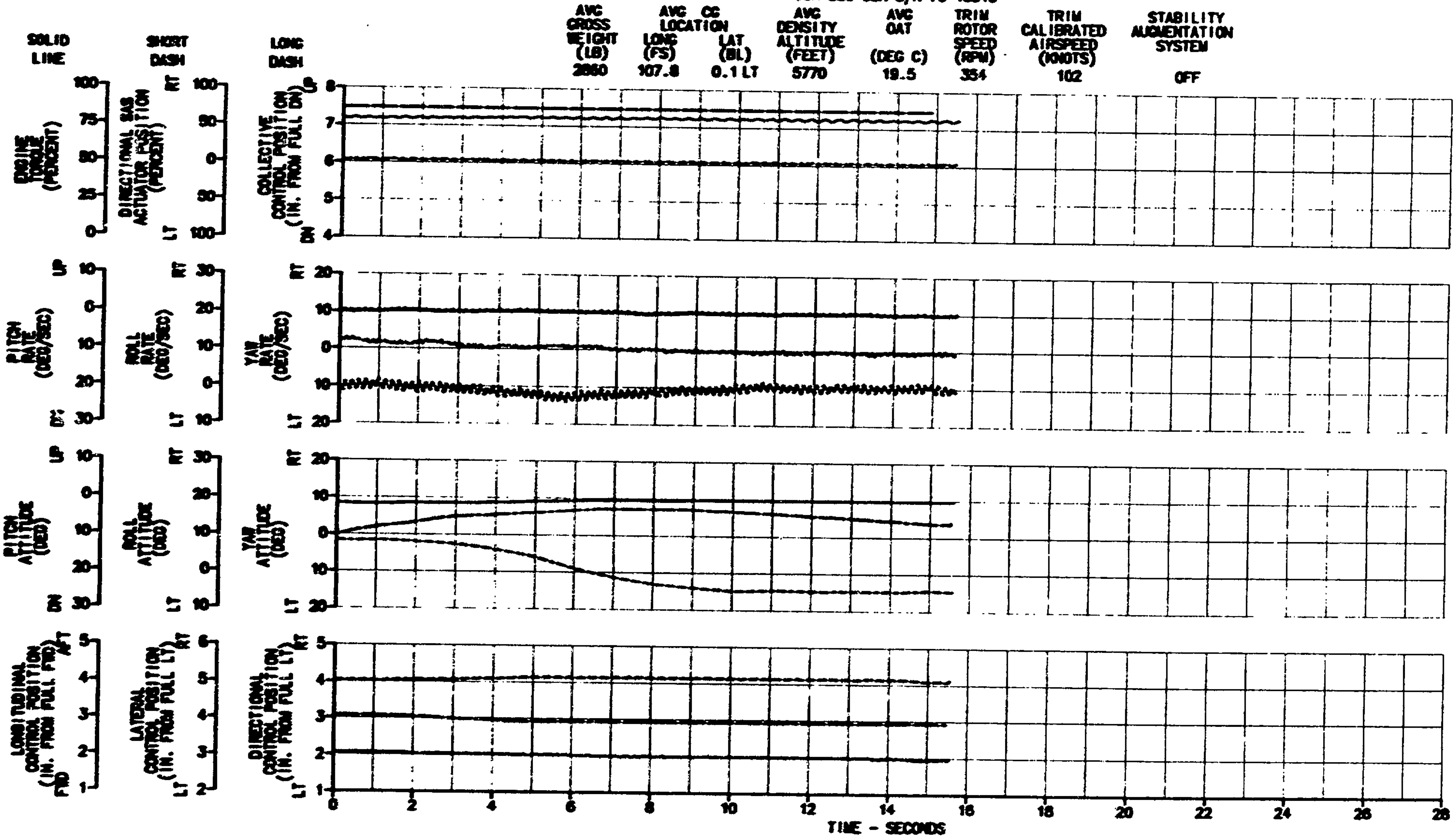


FIGURE E-148
LONGITUDINAL LONG-TERM RESPONSE
JOH-58C USA S/N 70-15340

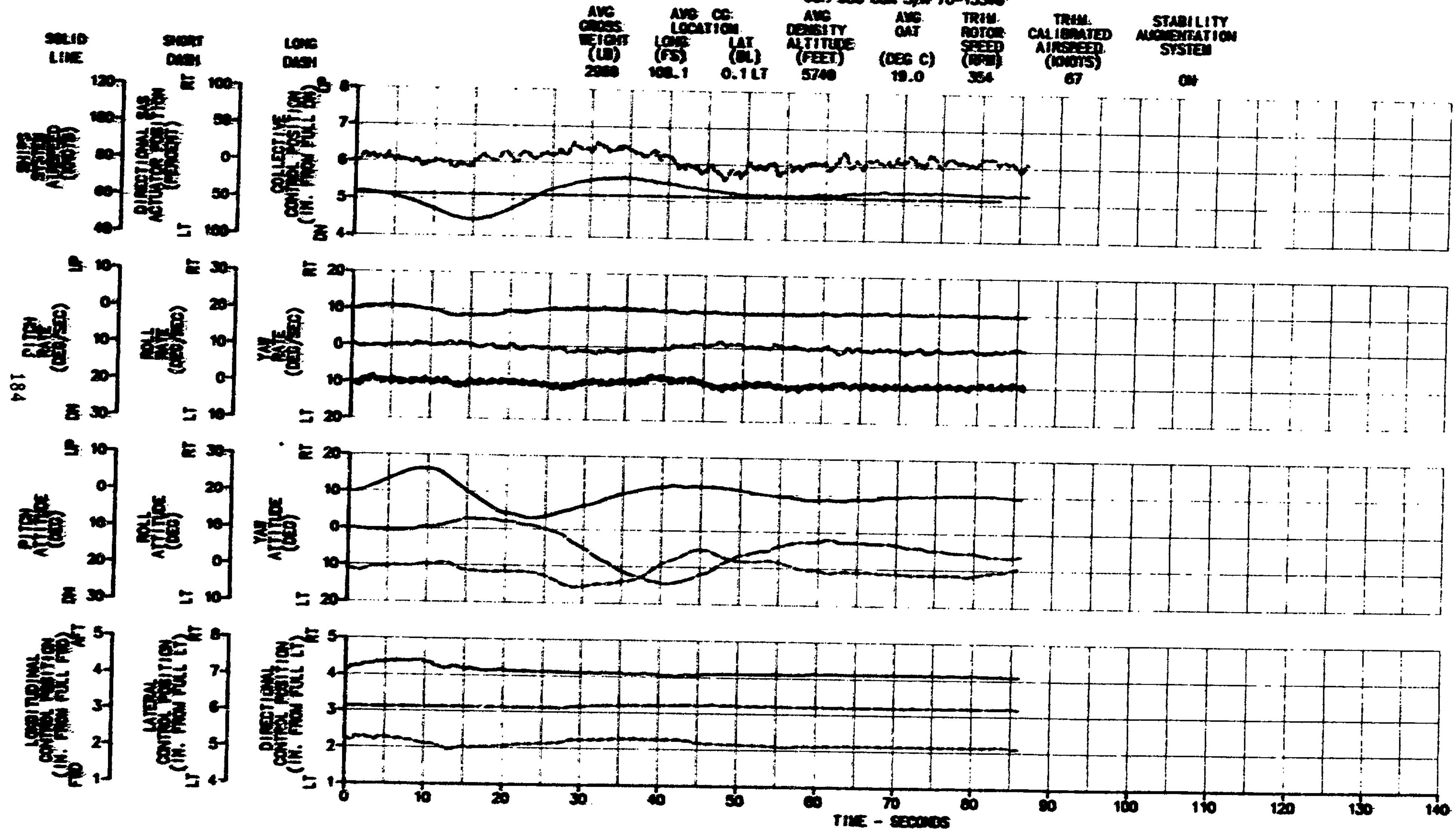


FIGURE E-149
LONGITUDINAL LONG-TERM RESPONSE
JOH-58C USA S/N 70-15349

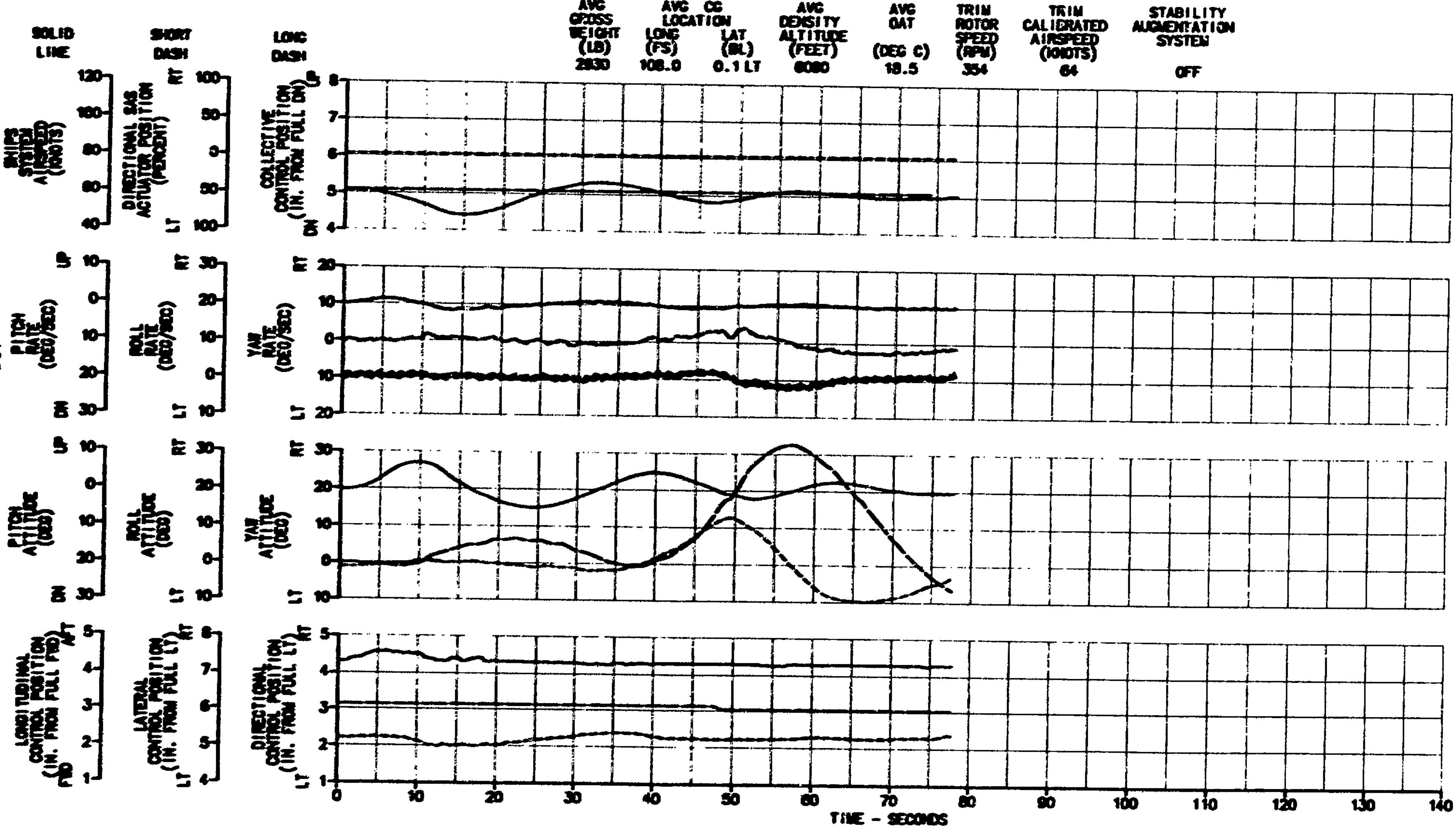


FIGURE E-150
LONGITUDINAL LONG-TERM RESPONSE
JOH-58C USA S/N 70-15349

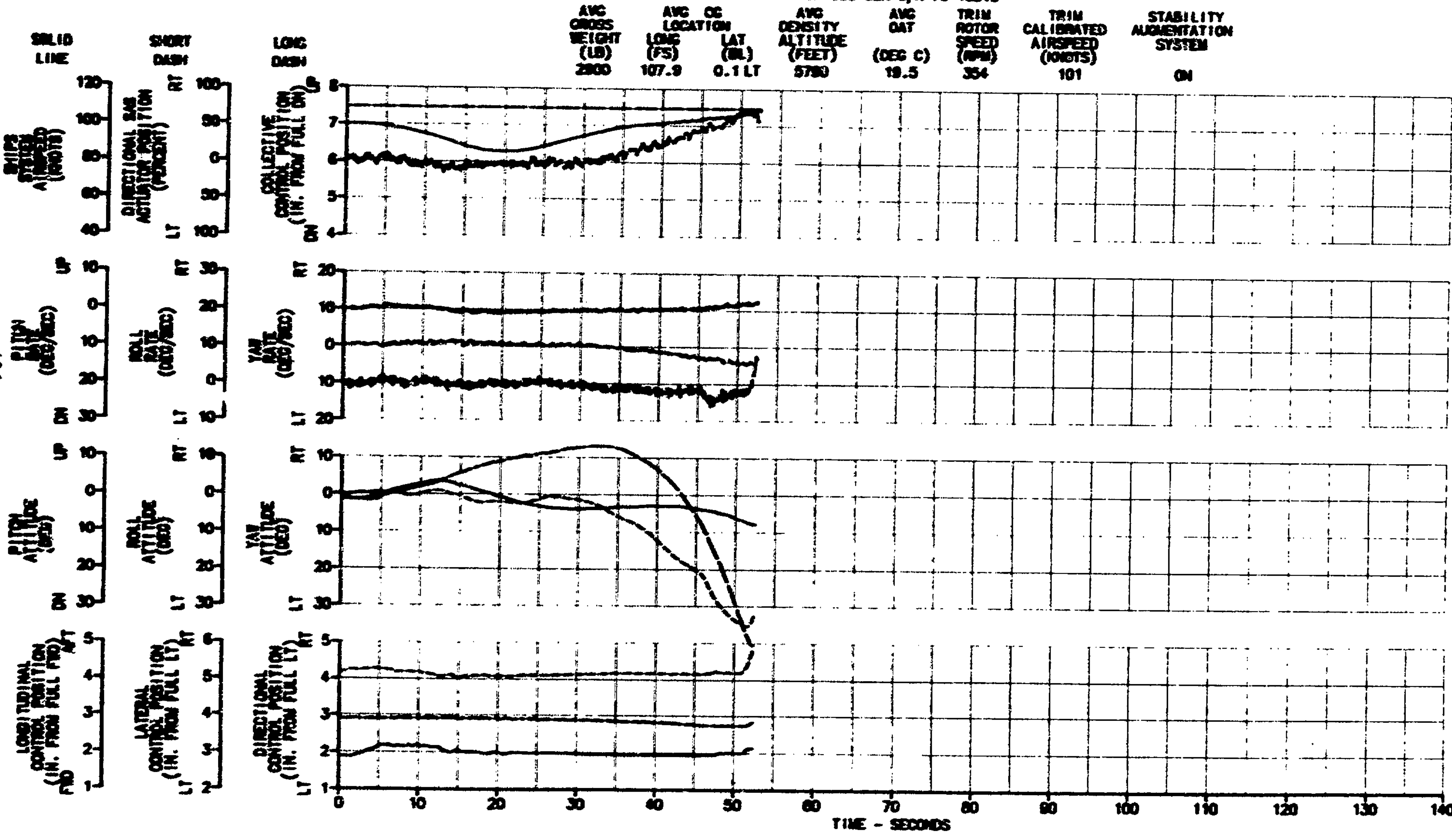


FIGURE E-151
LONGITUDINAL LONG-TERM RESPONSE
JOH-58C USA S/N 70-15349

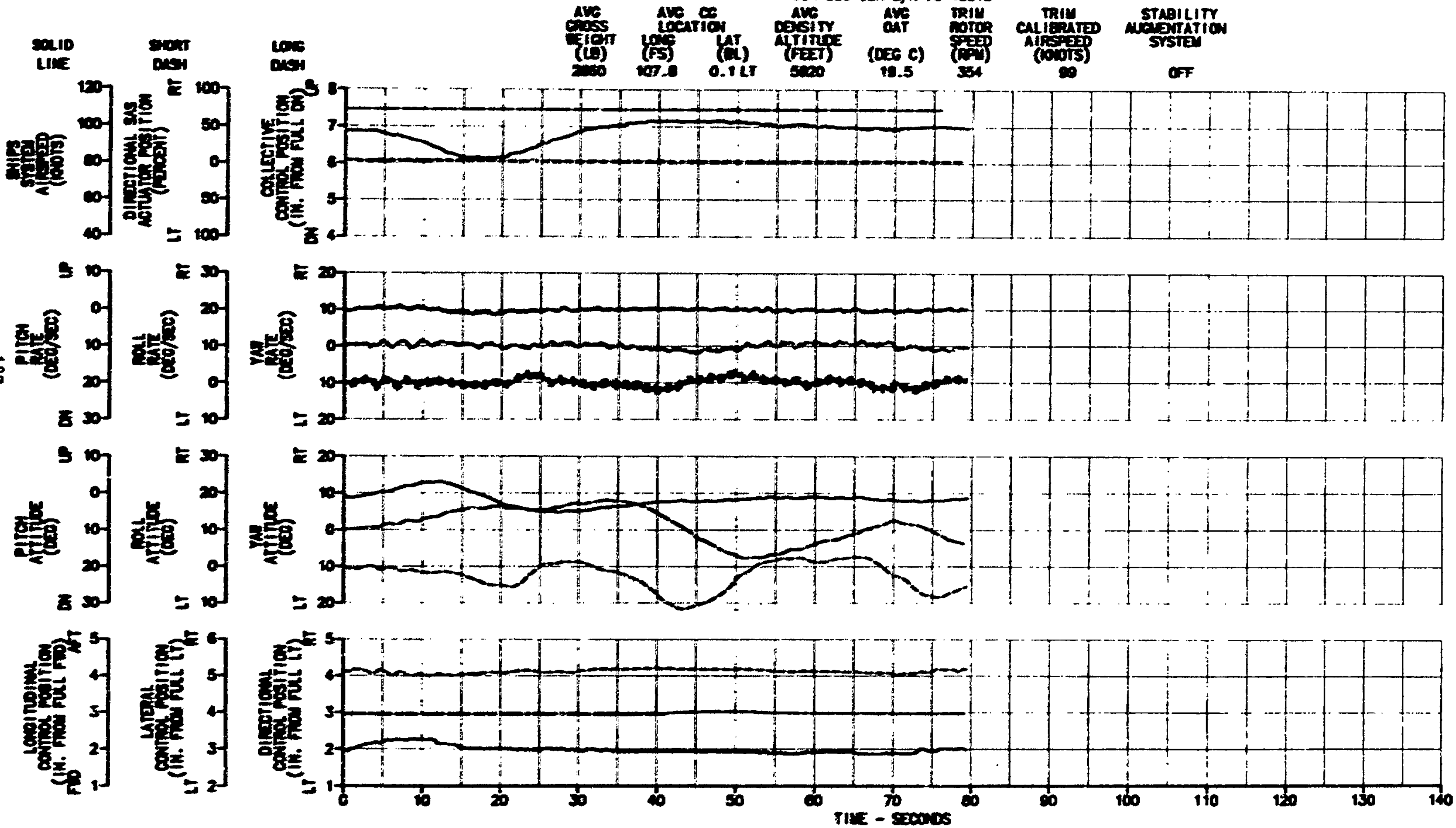


FIGURE E-152
DIRECTIONAL CONTROLLABILITY - HOVER
JOH-58C USA S/N 70-15349

SYM	AVG GROSS WEIGHT (LBS)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	TRIM DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
○	2940	108.1	0.3LT	2400	15	354	0	ON
△	2940	108.0	0.2LT	2500	16	354	0	OFF

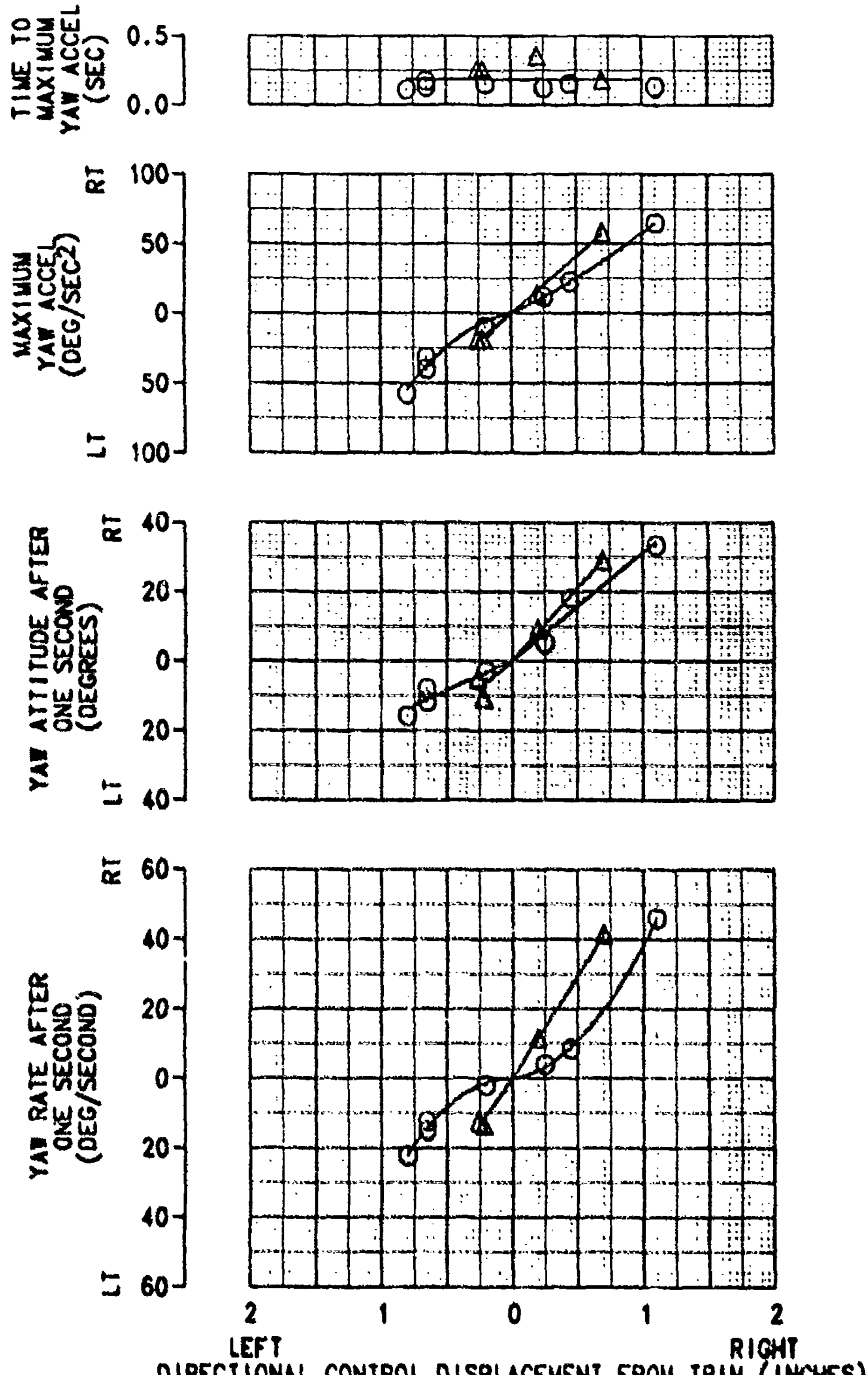


FIGURE E-153

DIRECTIONAL CONTROLLABILITY - 090 DEGREE AZIMUTH

JOH-58C USA S/N 70-15349

SYM	AVG GROSS WEIGHT (LBS)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	TRIM DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
⊙	2890	108.5	0.0	3300	19.0	354	10	ON
△	2880	108.4	0.0	3350	19.5	354	10	OFF

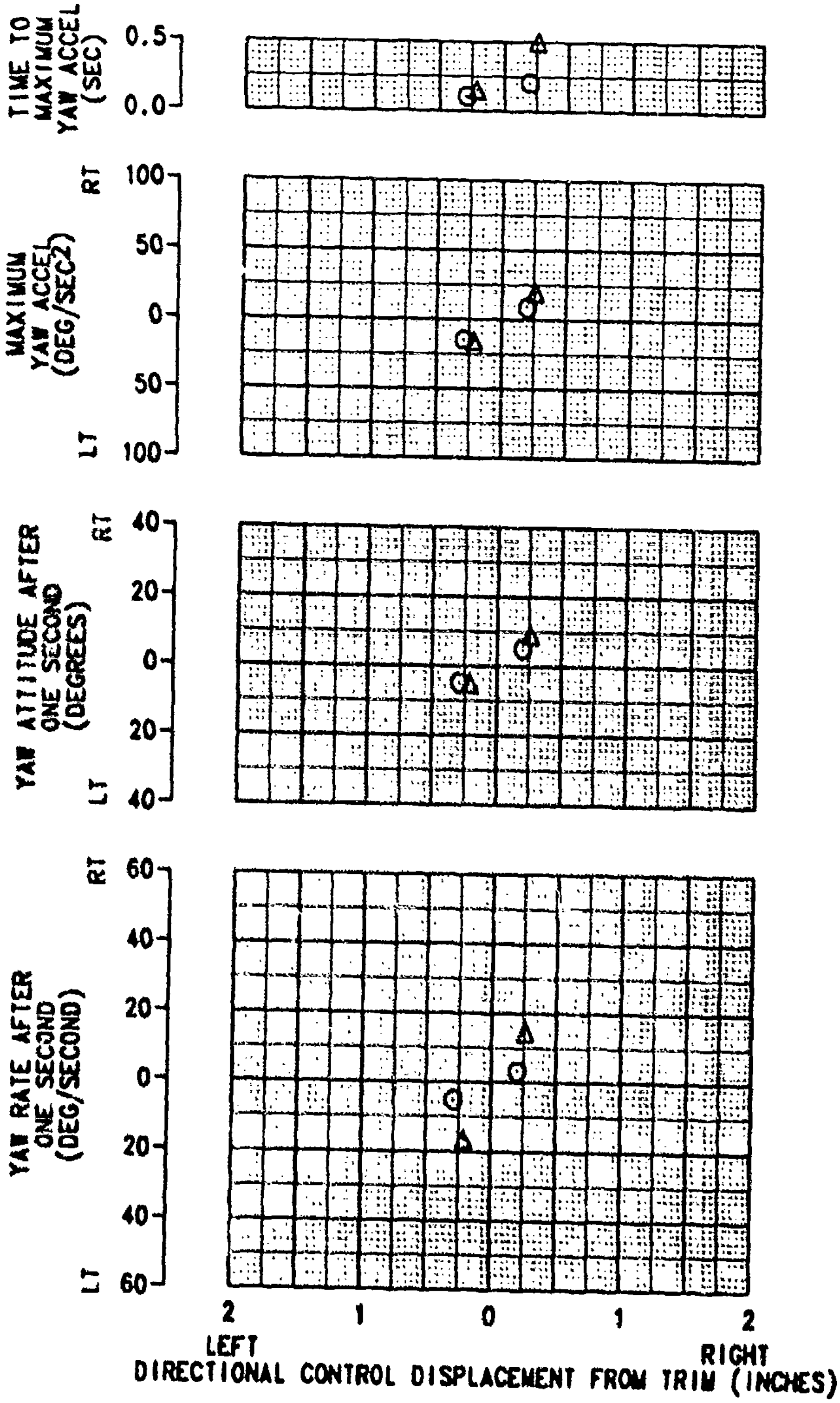


FIGURE E-154
DIRECTIONAL CONTROLLABILITY - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

SYM	AVG GROSS WEIGHT (LBS)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	TRIM DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
○	2920	106.9	0.0	3250	18.0	353	15	ON
△	2910	106.8	0.0	3300	18.5	353	15	OFF

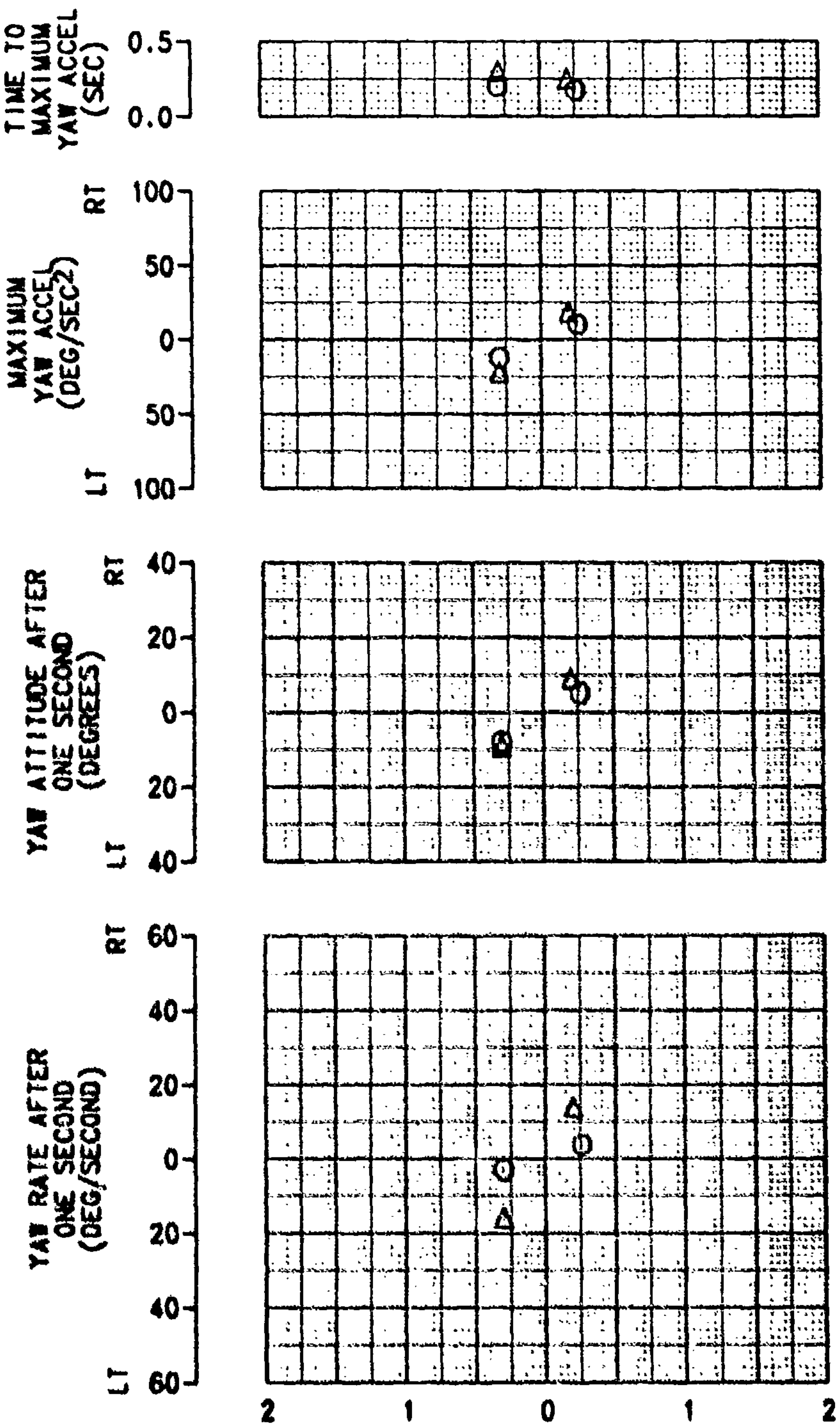


FIGURE E-155
DIRECTIONAL CONTROLLABILITY - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

SYM	AVG GROSS WEIGHT (LBS)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	TRIM DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
⊙	2900	106.8	0.0	3200	18.0	353	20	ON
Δ	2930	106.5	0.0	3200	18.0	353	20	OFF

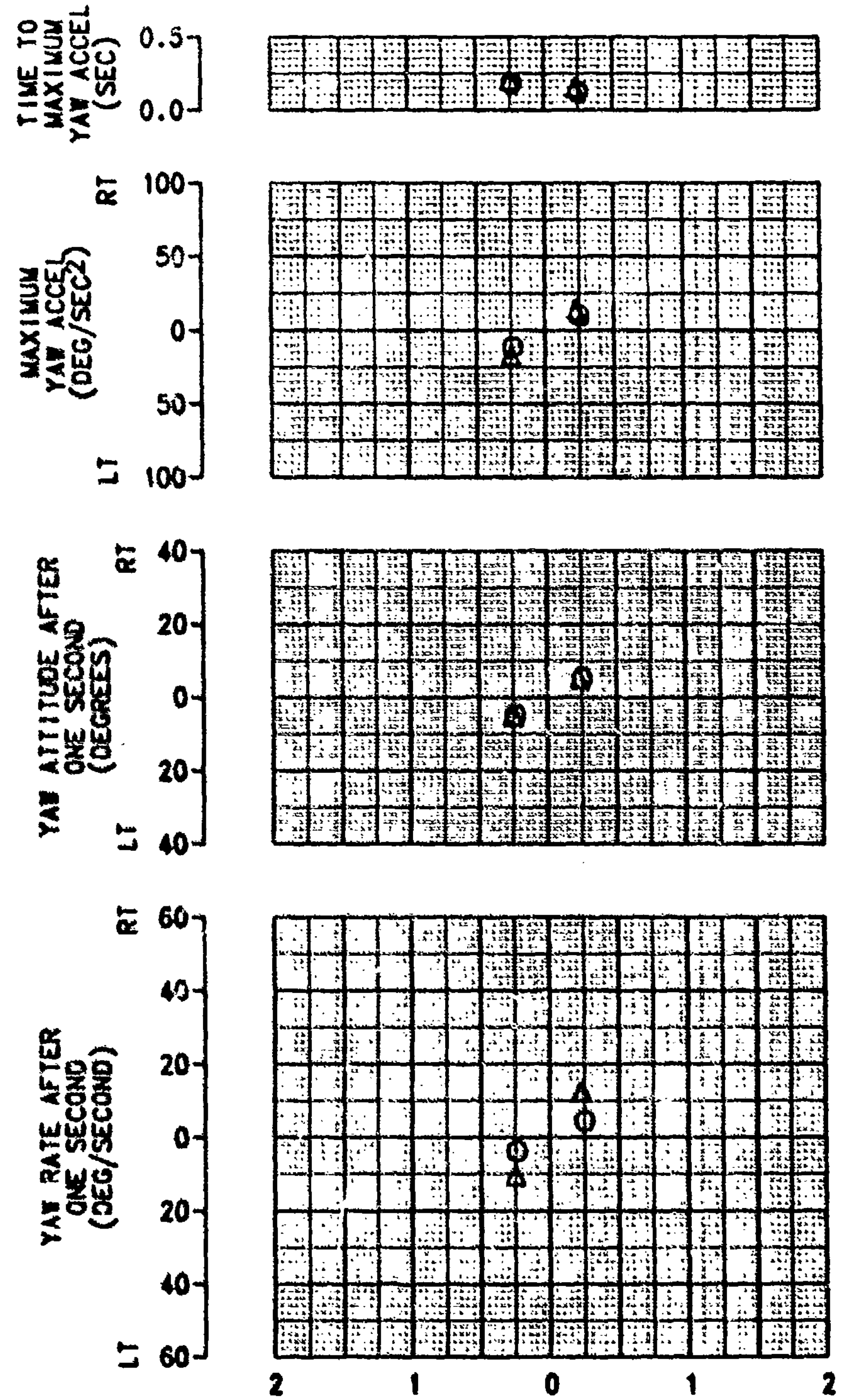


FIGURE E-156

DIRECTIONAL CONTROLLABILITY - 270 DEGREE AZIMUTH

JOH-58C USA S/N 70-15349

SYM	AVG GROSS WEIGHT (LBS)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	TRIM DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRIM TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
○	2910	106.4	0.0	3280	18.5	354	10	ON
△	2890	106.4	0.0	3380	19.5	354	10	OFF

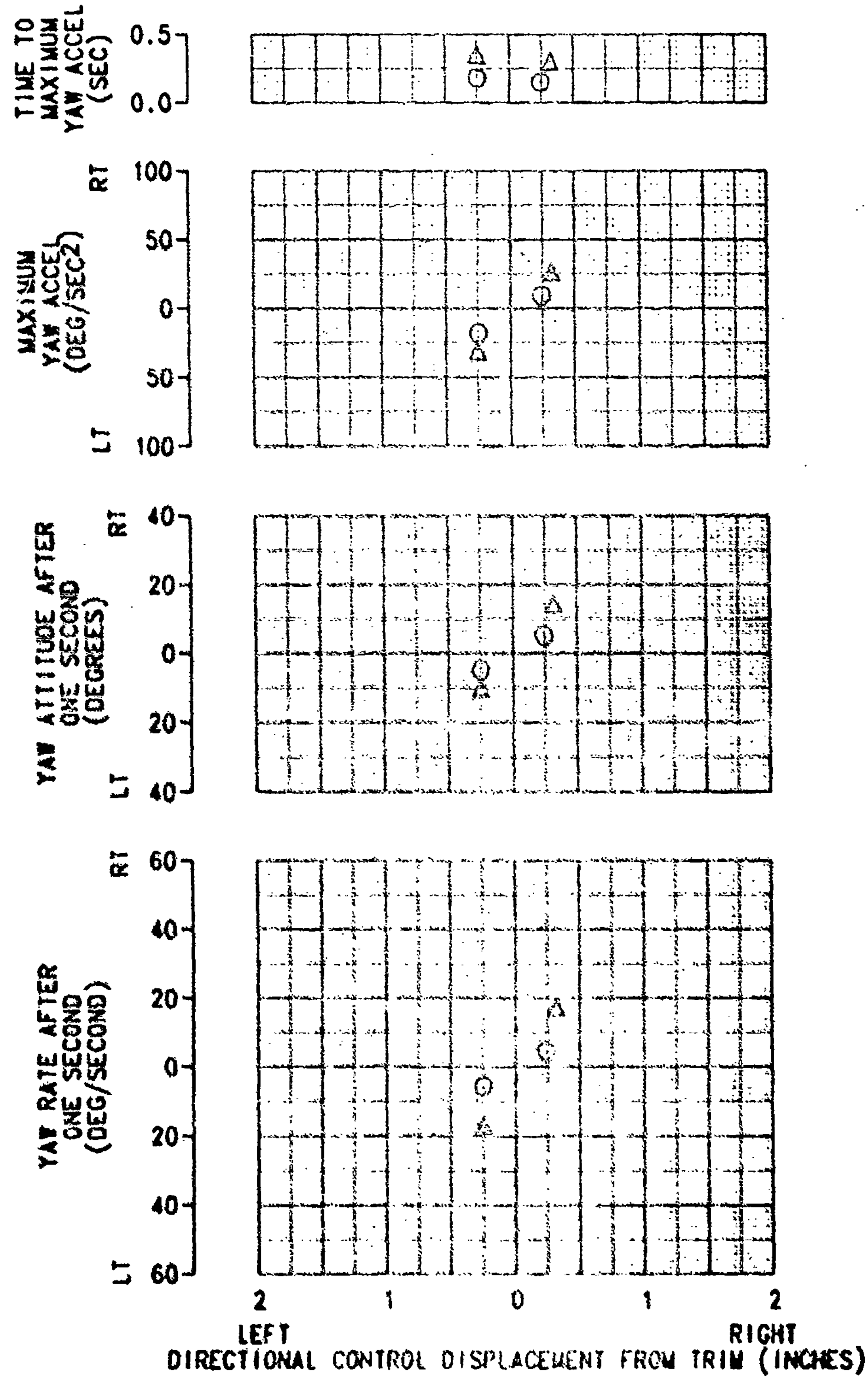


FIGURE E-158
LOW SPEED FLIGHT
180 AND 360 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2970	107.7	0.0	3360	19.5	354	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

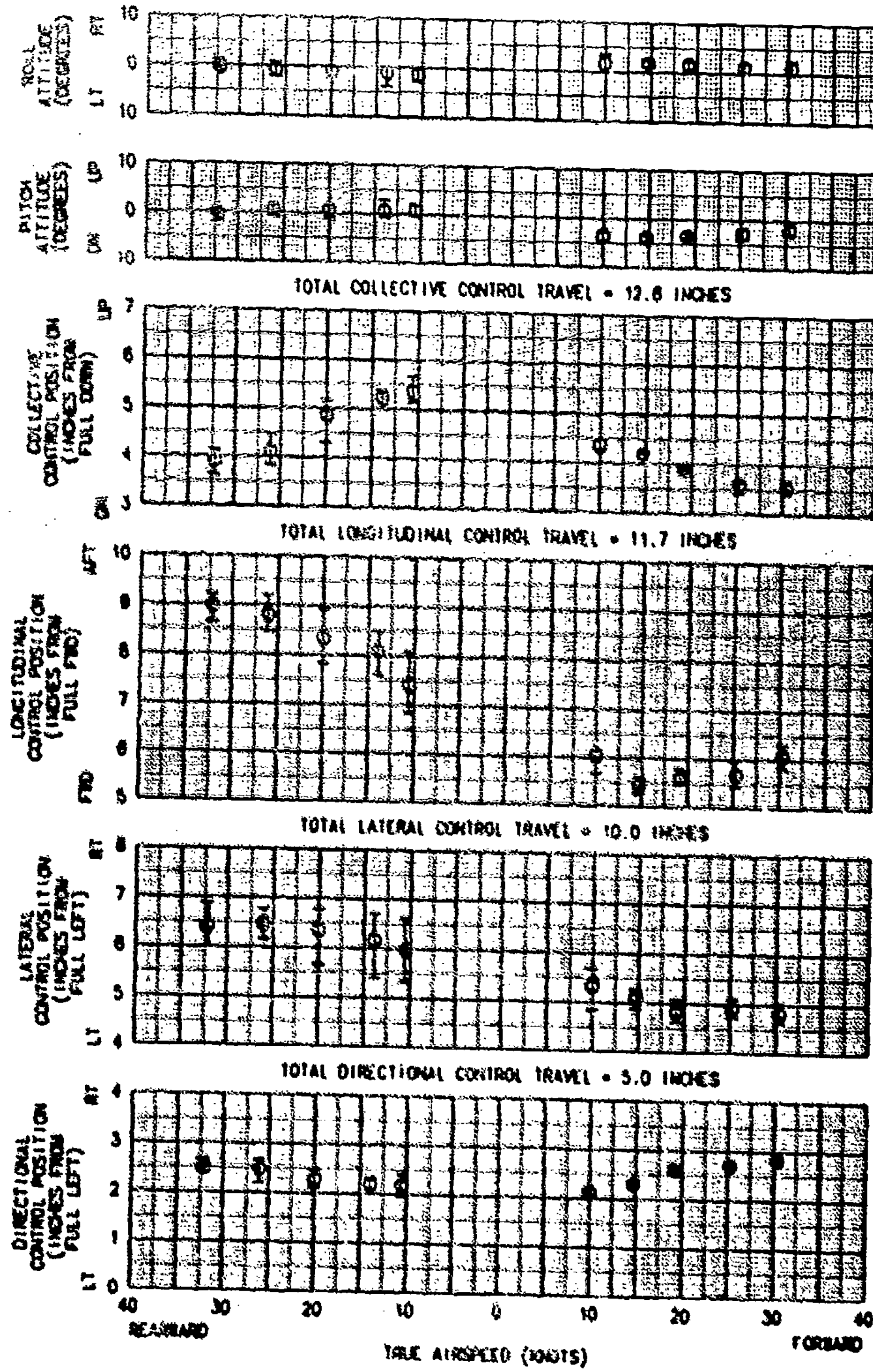


FIGURE E-158
LOW SPEED FLIGHT
180 AND 360 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2970	107.7	0.0	3380	19.5	354	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

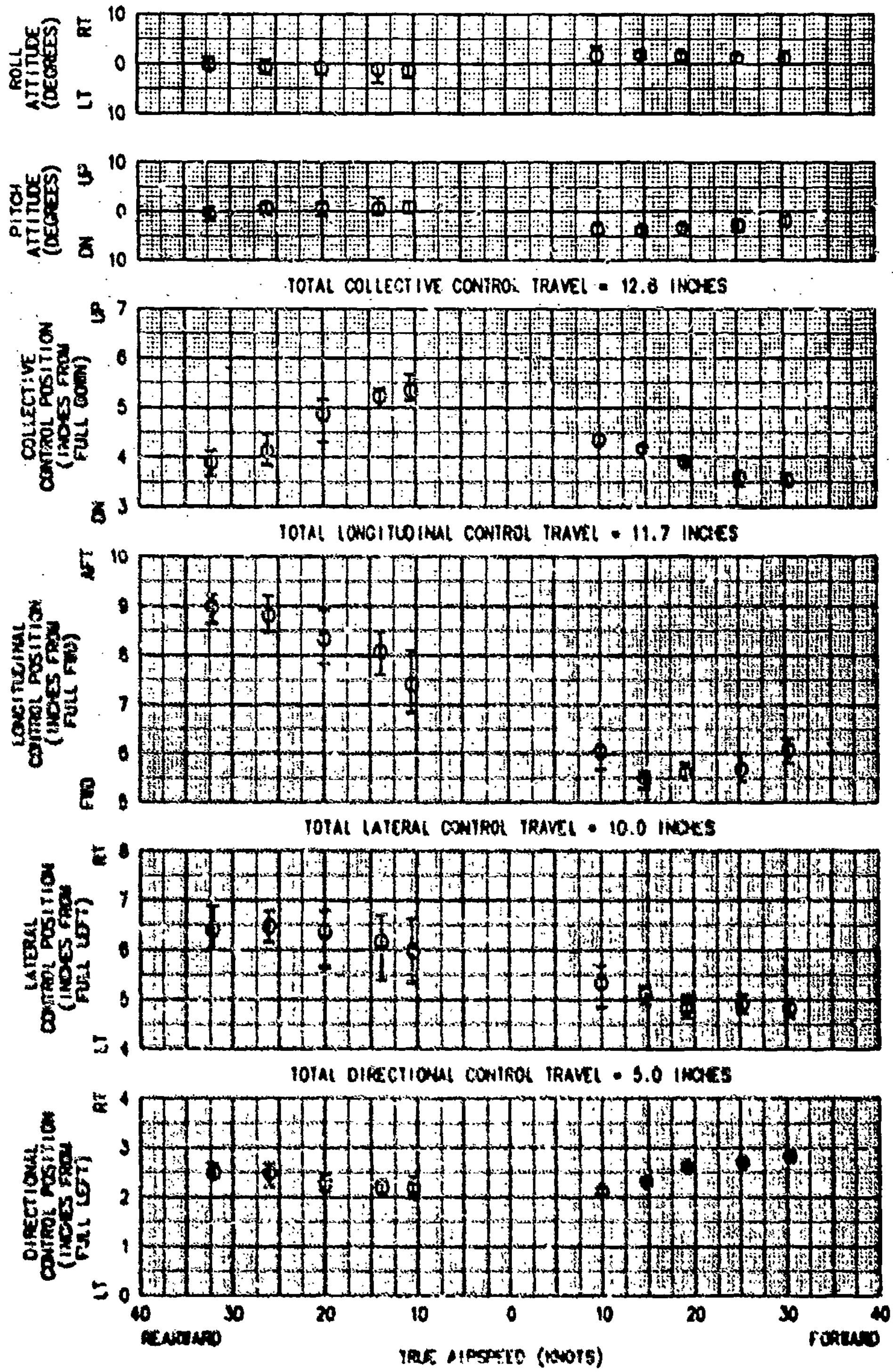


FIGURE E-159
LOW SPEED FLIGHT
180 AND 360 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2970	107.7	0.0	3350	19.5	354	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

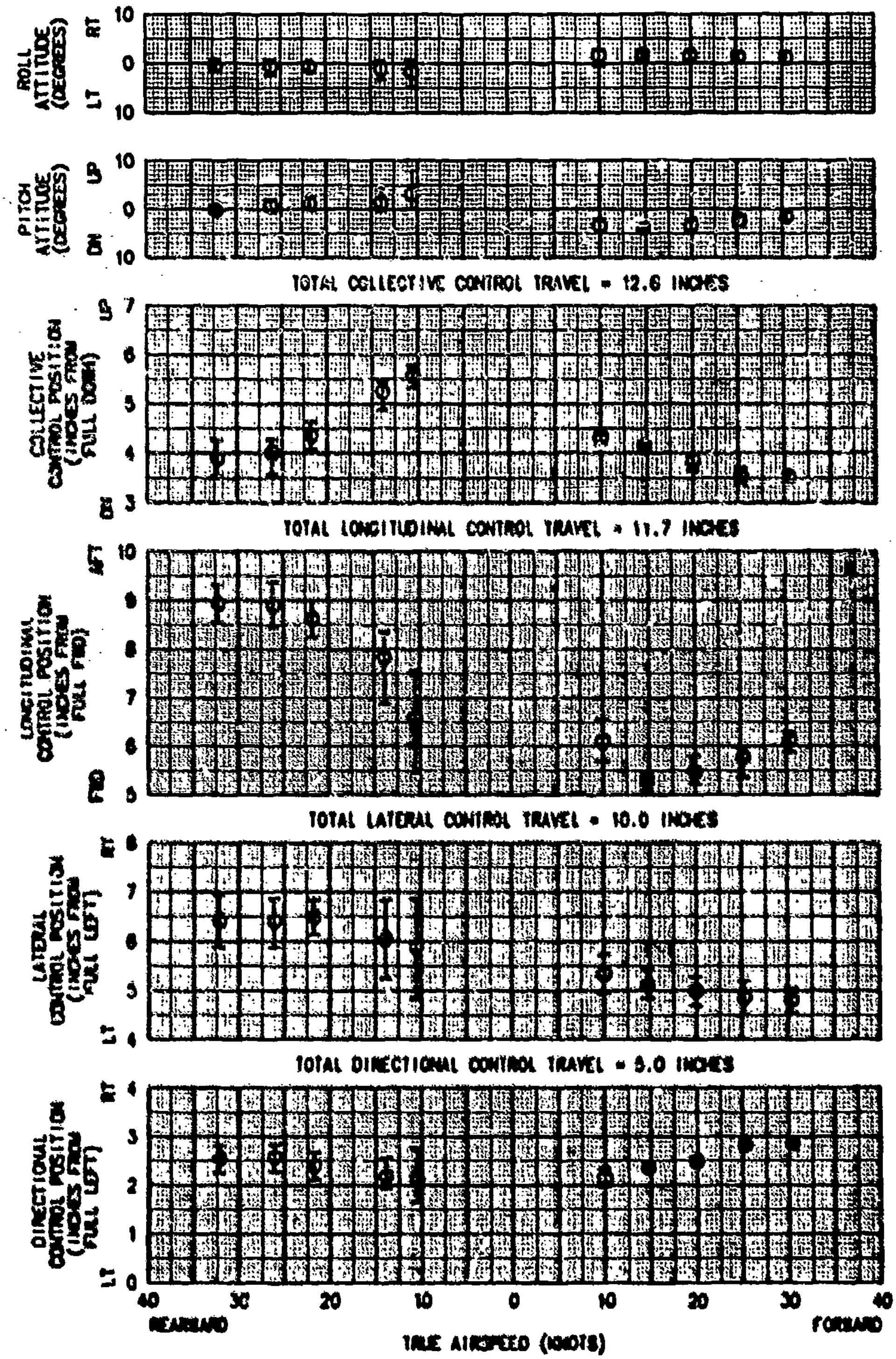


FIGURE E-160
LOW SPEED FLIGHT
45 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2950	107.2	0.0	3020	16.5	354	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

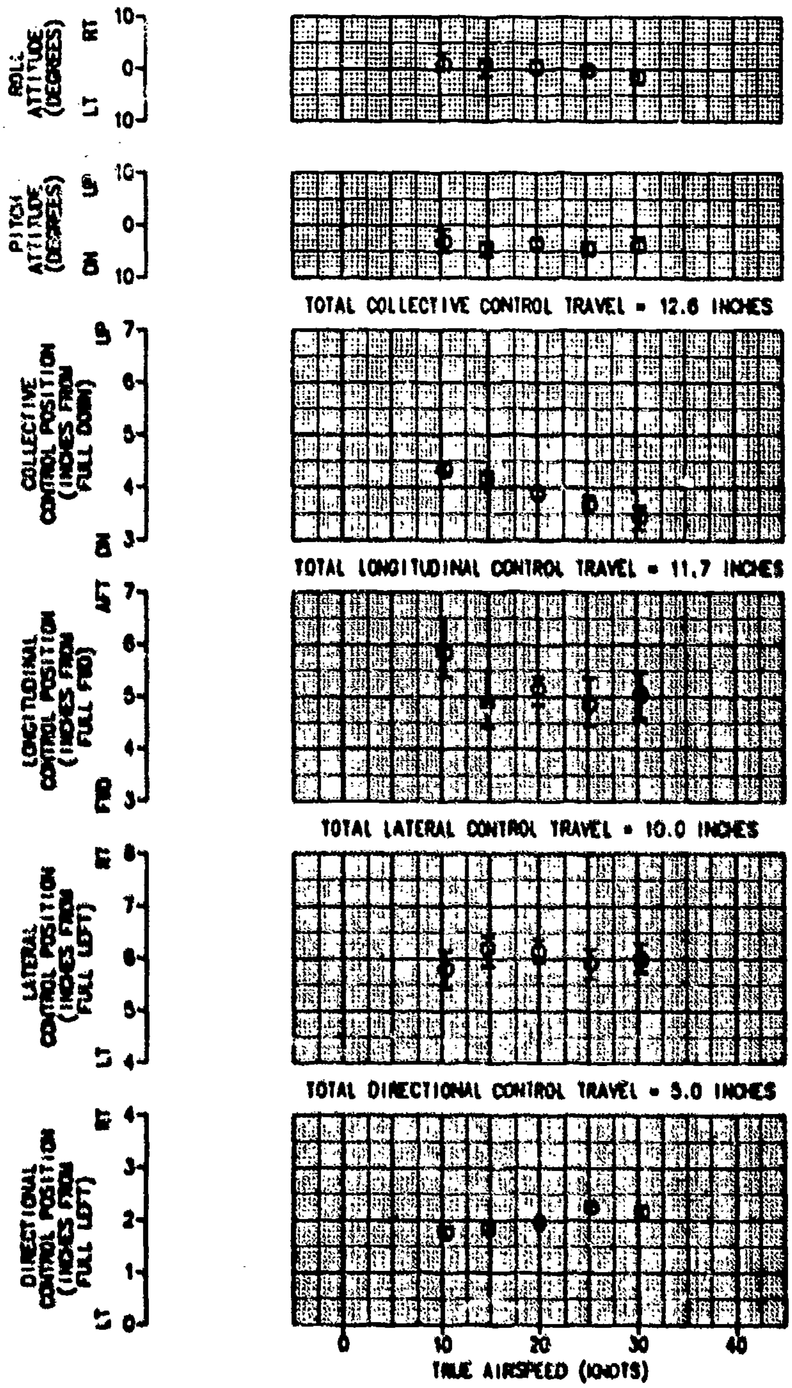


FIGURE E-161
LOW SPEED FLIGHT
45 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2980	107.1	0.0	3040	16.5	354	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

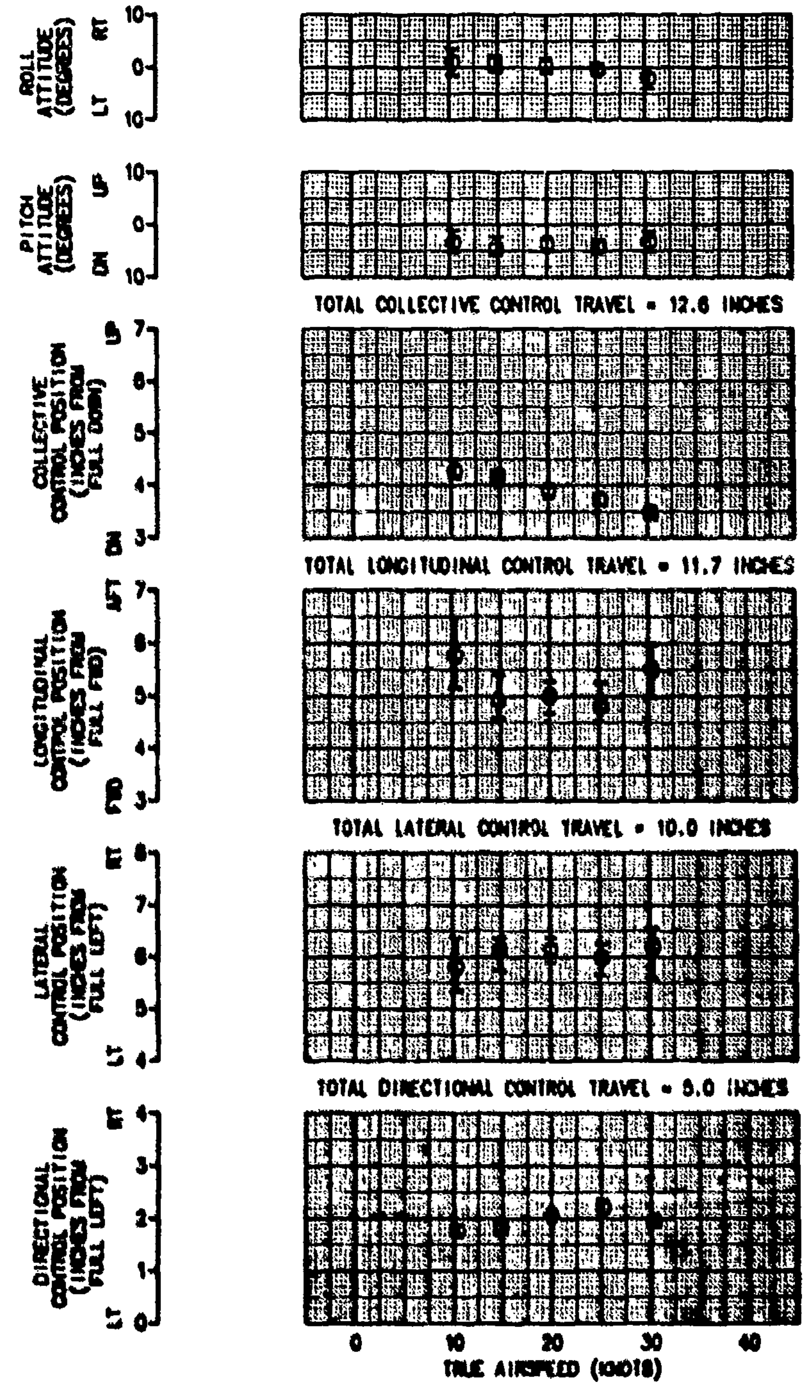


FIGURE E-162
LOW SPEED FLIGHT
270 AND 90 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2980	107.2	0.0	3400	20.0	355	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

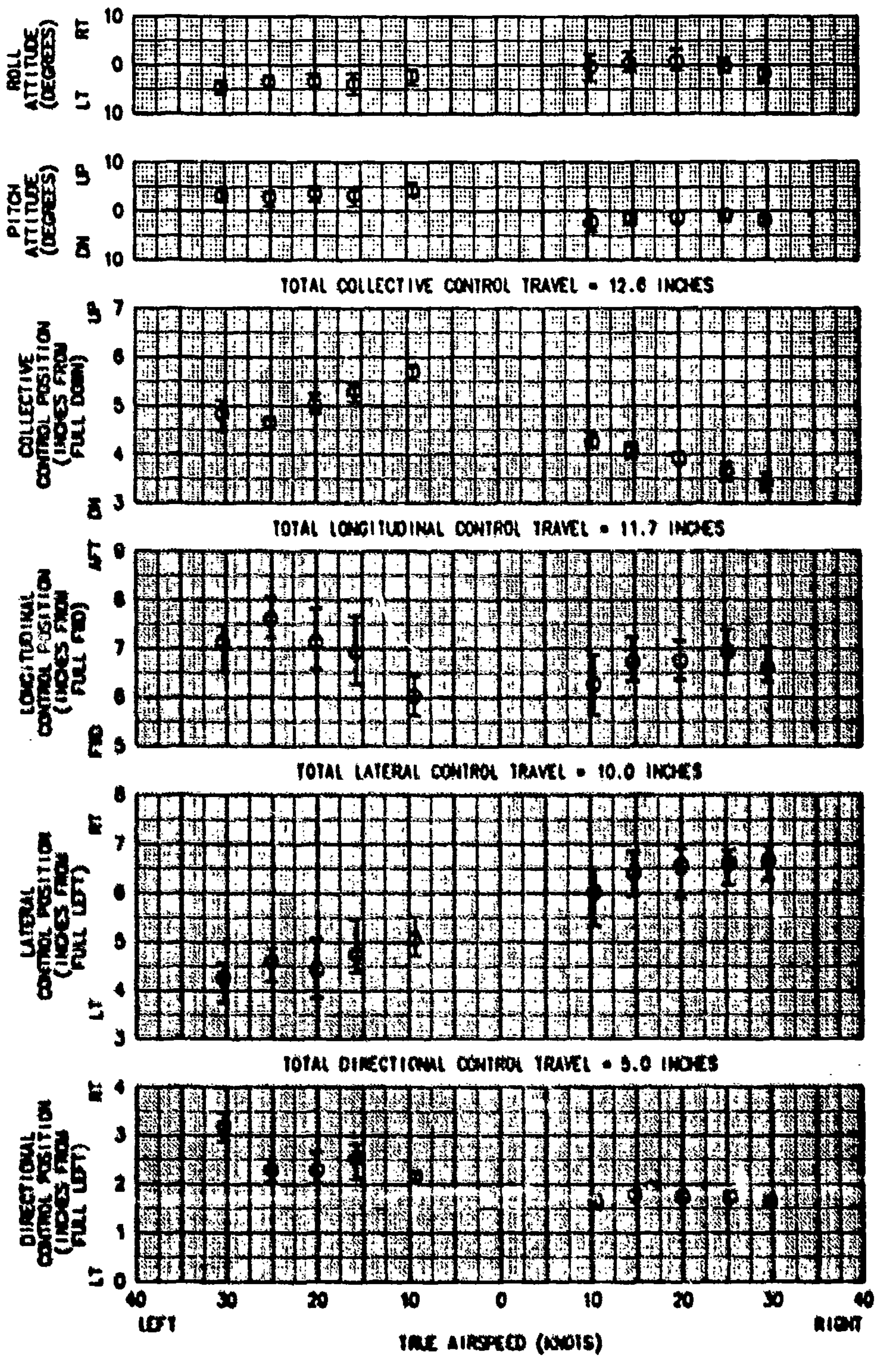


FIGURE E-163
LOW SPEED FLIGHT
270 AND 90 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2970	107.2	0.0	3410	20.0	356	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

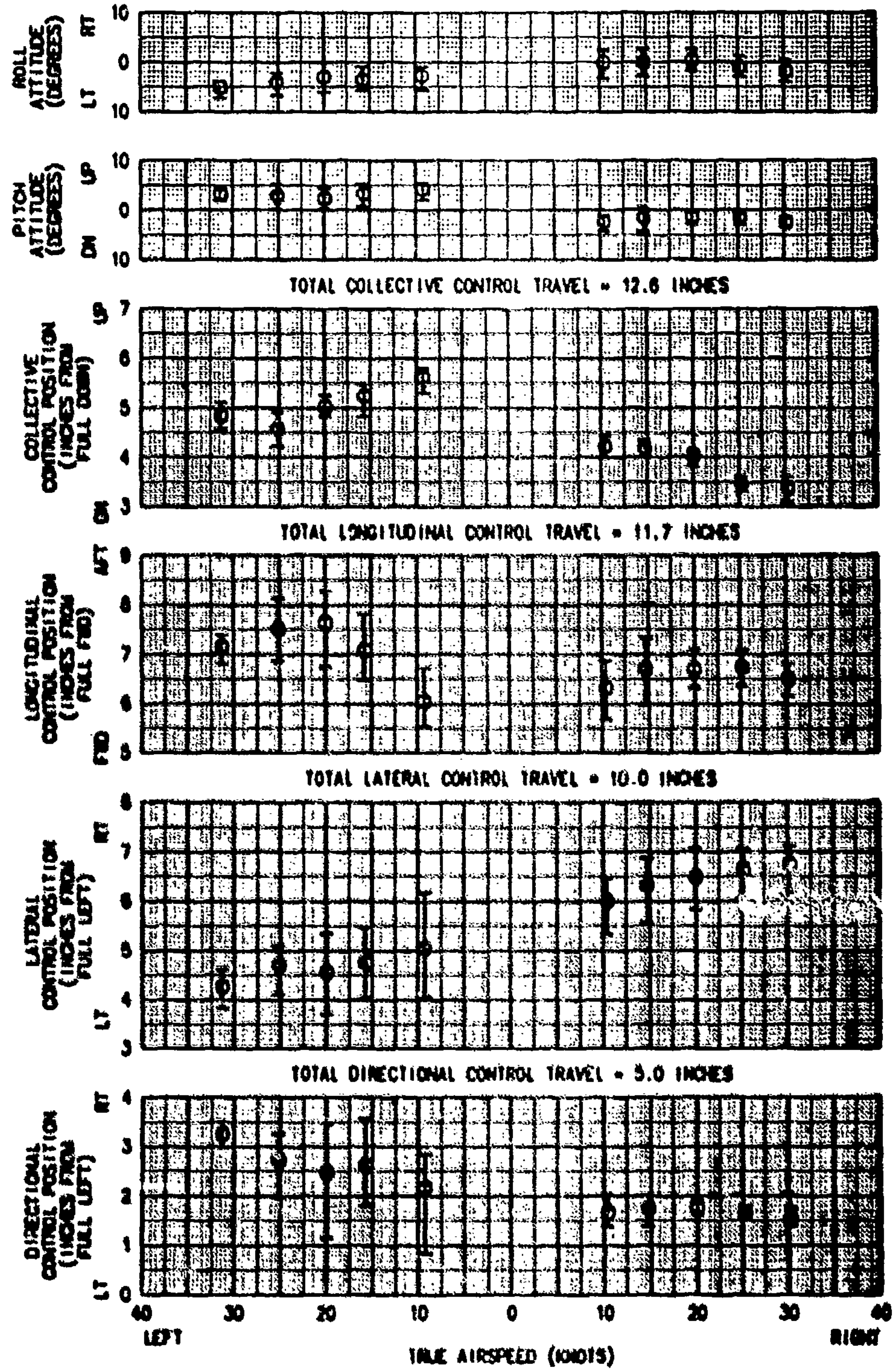


FIGURE E-164
LOW SPEED FLIGHT
120 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG CAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2960	106.4	0.0	3290	19.0	354	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

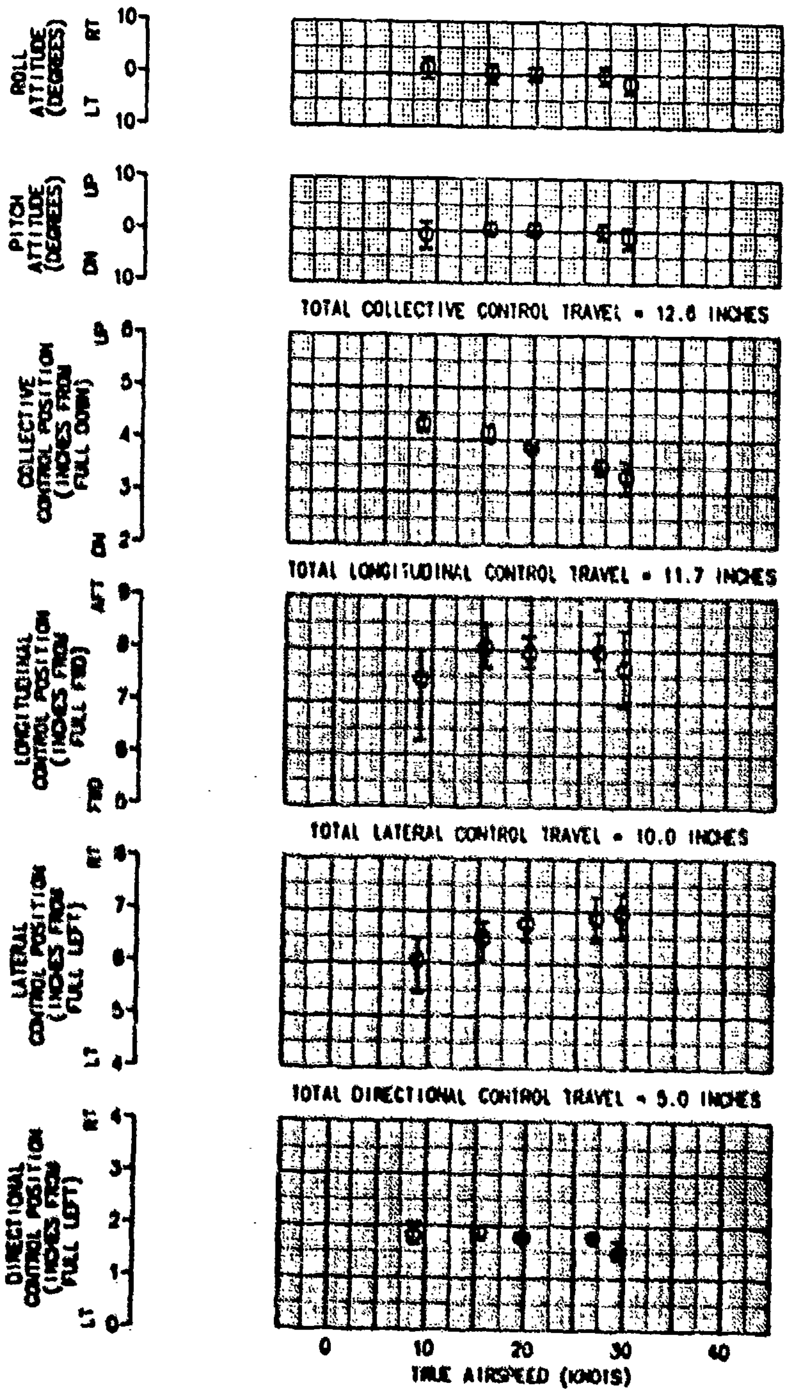


FIGURE E-185
LOW SPEED FLIGHT
120 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2960	106.3	0.0	3280	18.5	354	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

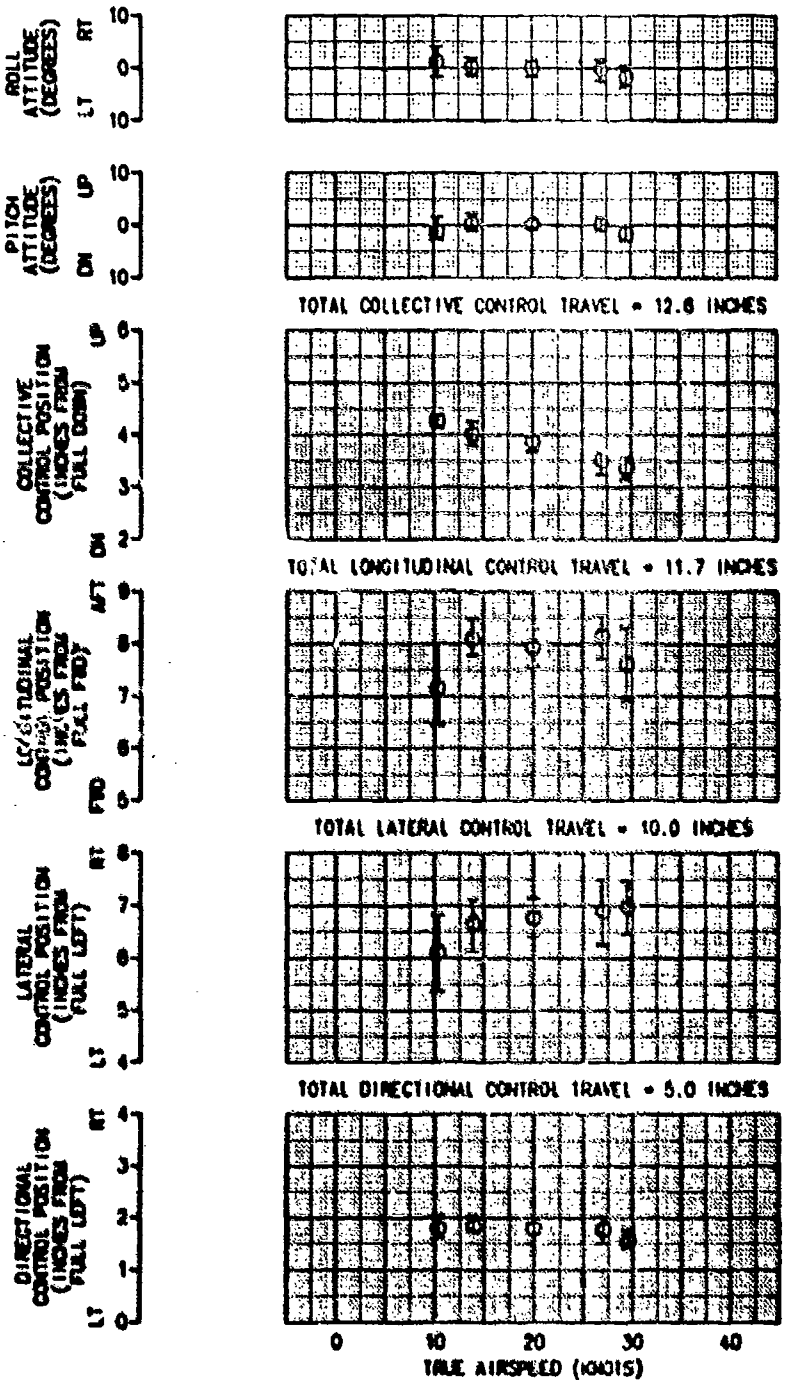


FIGURE E-166
LOW SPEED FLIGHT
150 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
3020	108.1	0.0	3730	23.0	354	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

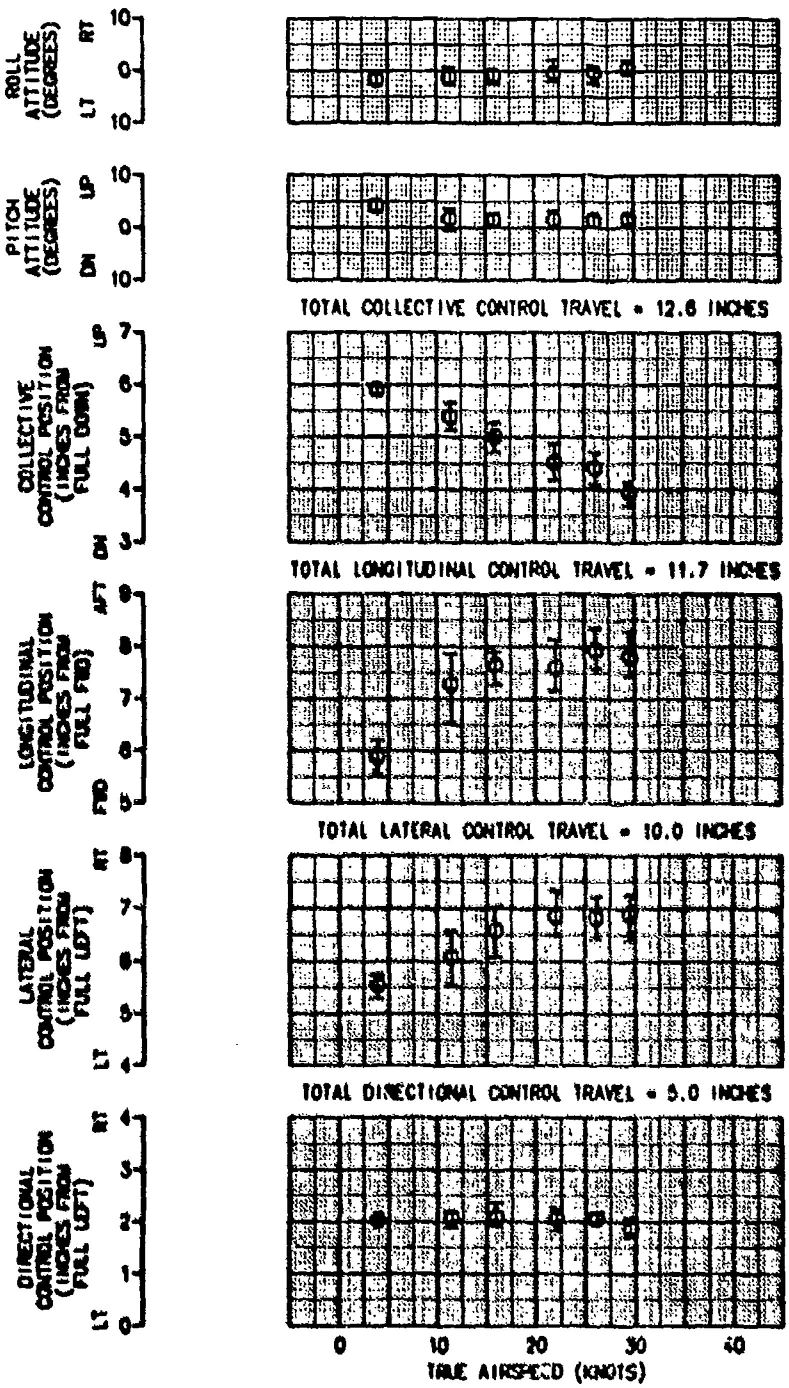


FIGURE E-167
LOW SPEED FLIGHT
150 DEGREE AZIMUTH
JUH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
3020	108.1	0.0	3770	23.0	354	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

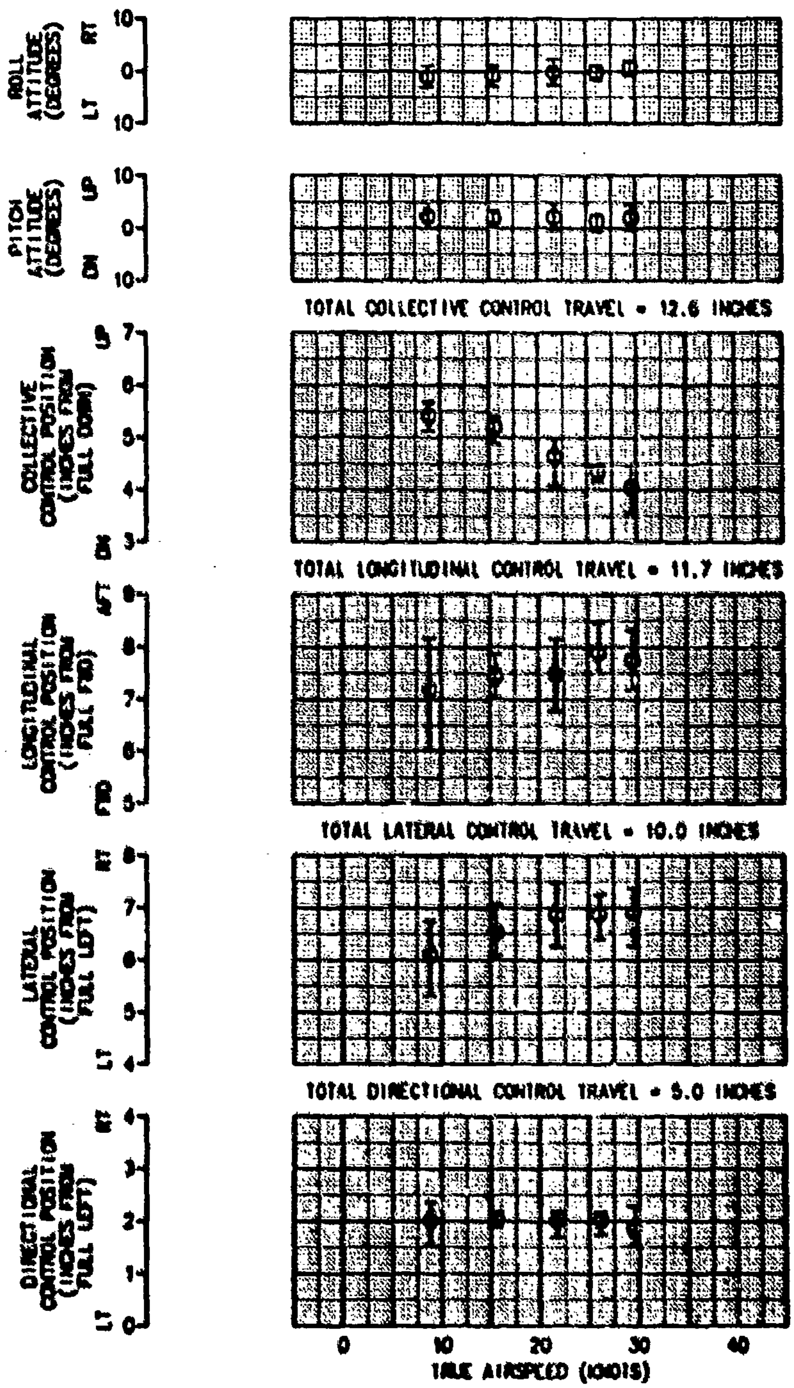


FIGURE E-168
LOW SPEED FLIGHT
210 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
3020	107.2	0.0	4070	25.5	355	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

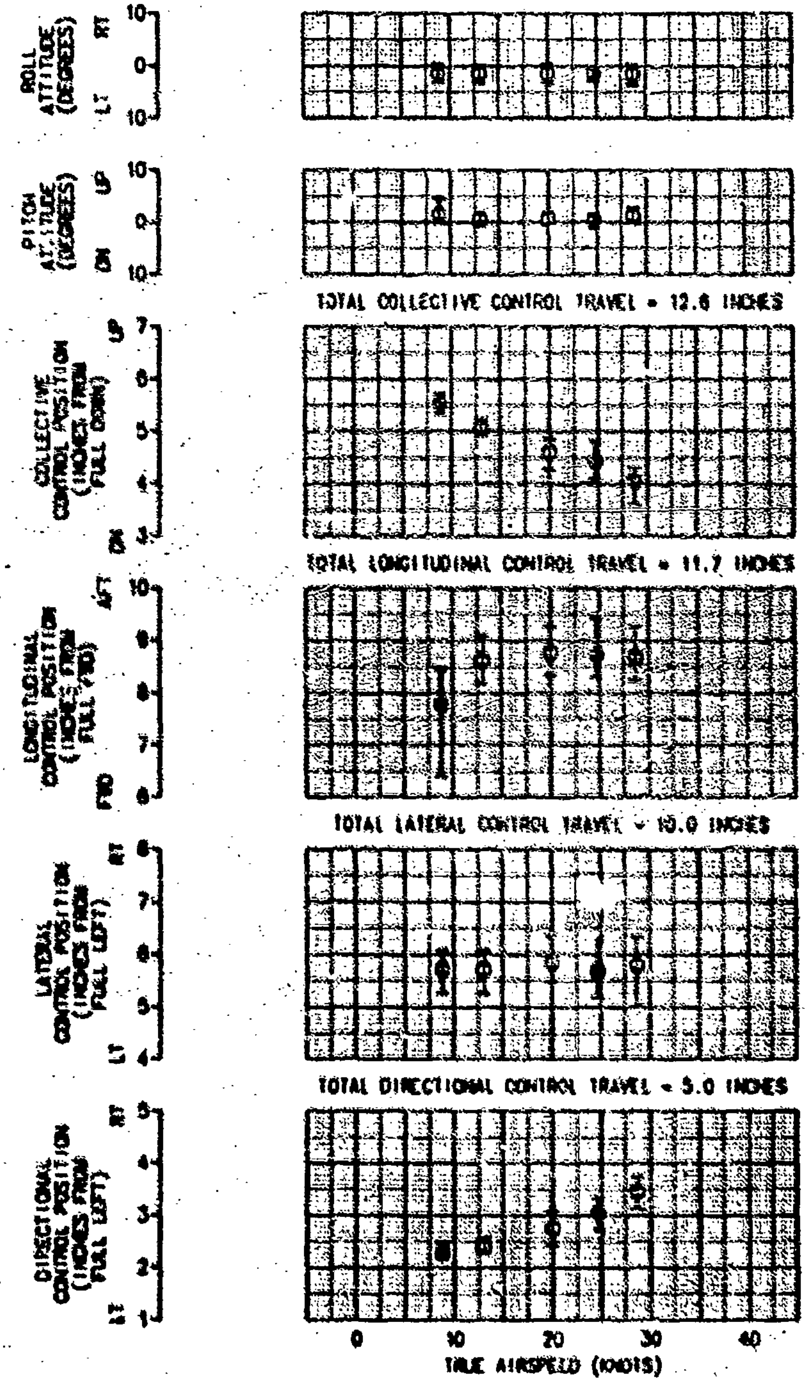


FIGURE E-169
LOW SPEED FLIGHT
210 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
3030	107.1	0.0	4040	25.5	355	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

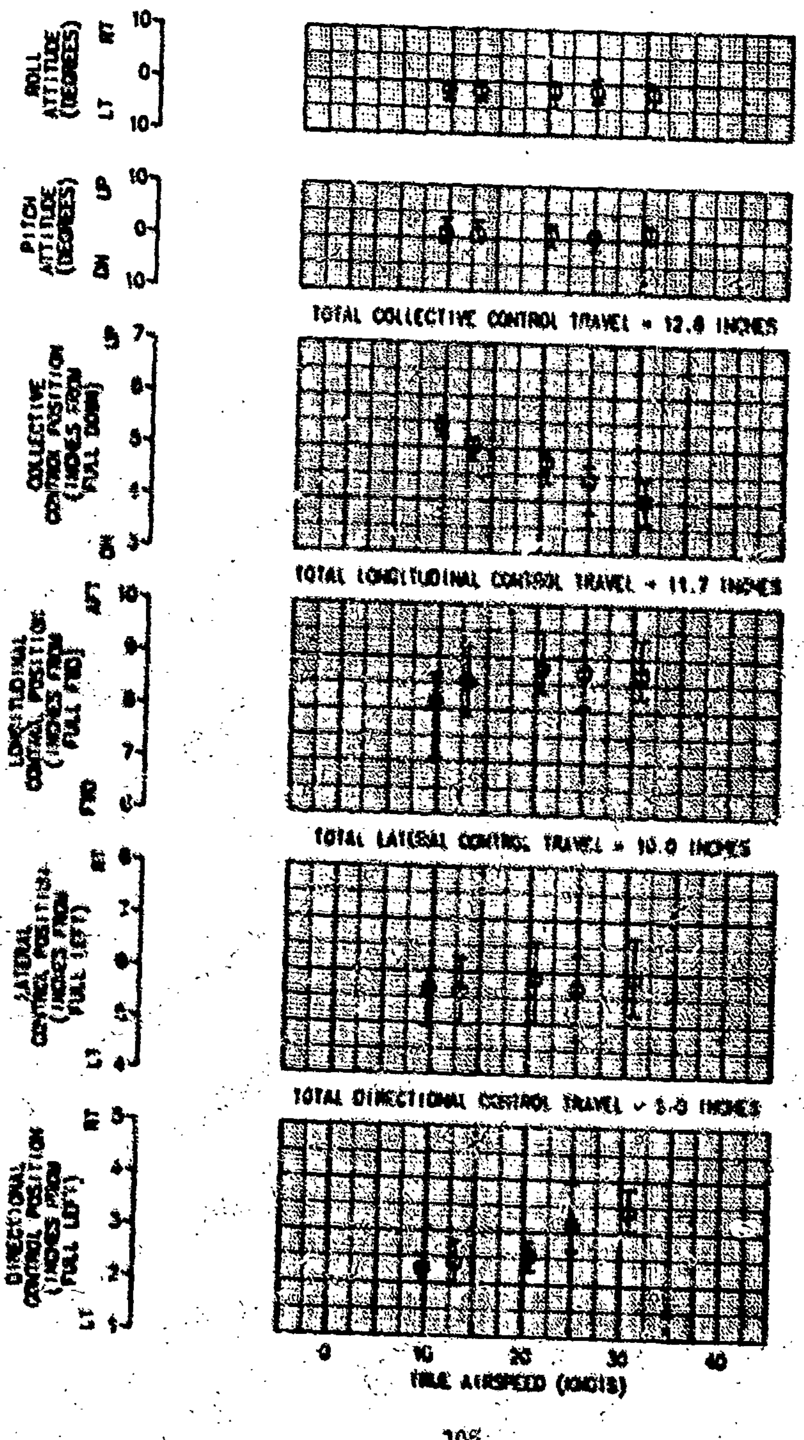


FIGURE E-170
LOW SPEED FLIGHT
225 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
3050	106.8	0.0	4070	25.5	355	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

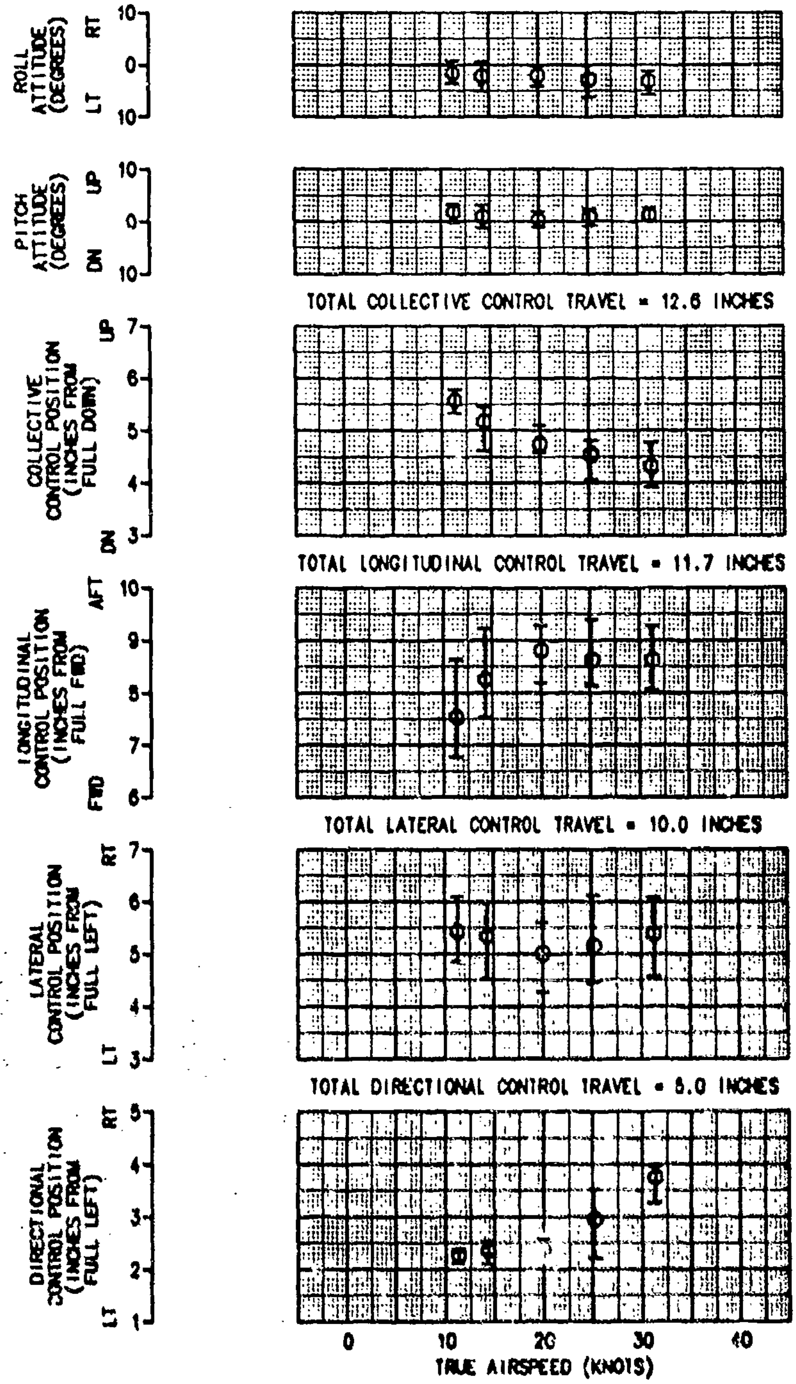


FIGURE E-171
LOW SPEED FLIGHT
225 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
3050	106.8	0.0	4070	25.5	356	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

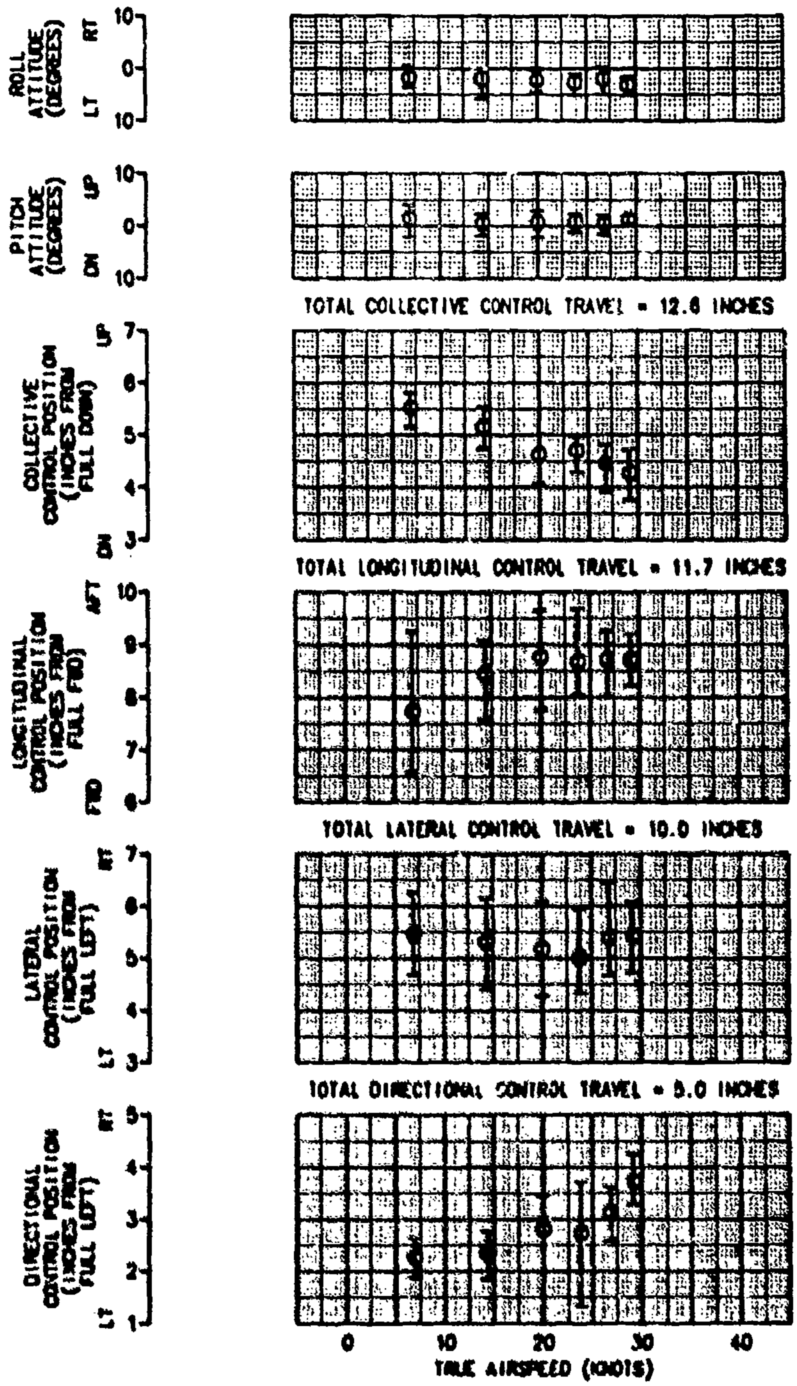


FIGURE E-172
LOW SPEED FLIGHT
240 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	108.2	0.0	3500	21.0	356	10

NOTES: 1 CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

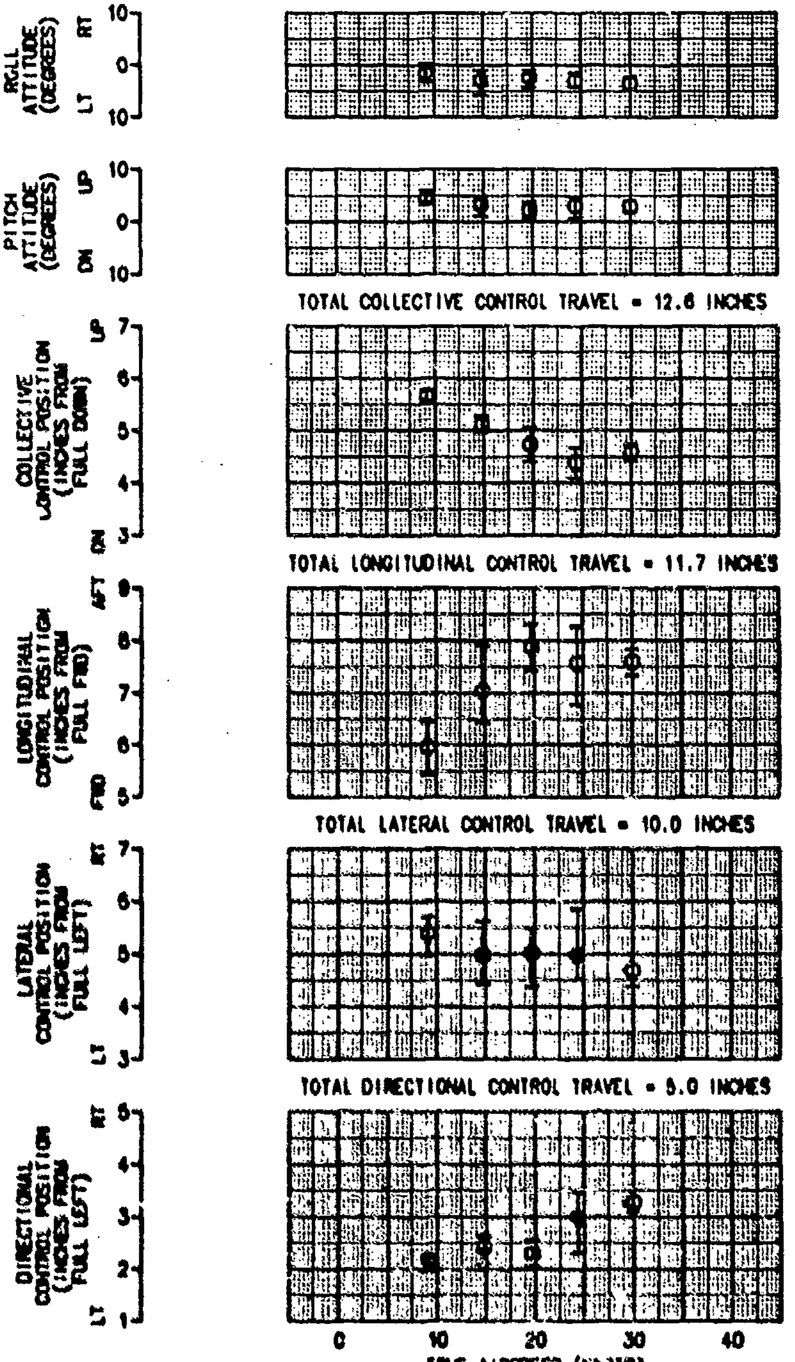


FIGURE E-173
LOW SPEED FLIGHT
240 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	108.1	0.0	3510	21.0	356	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

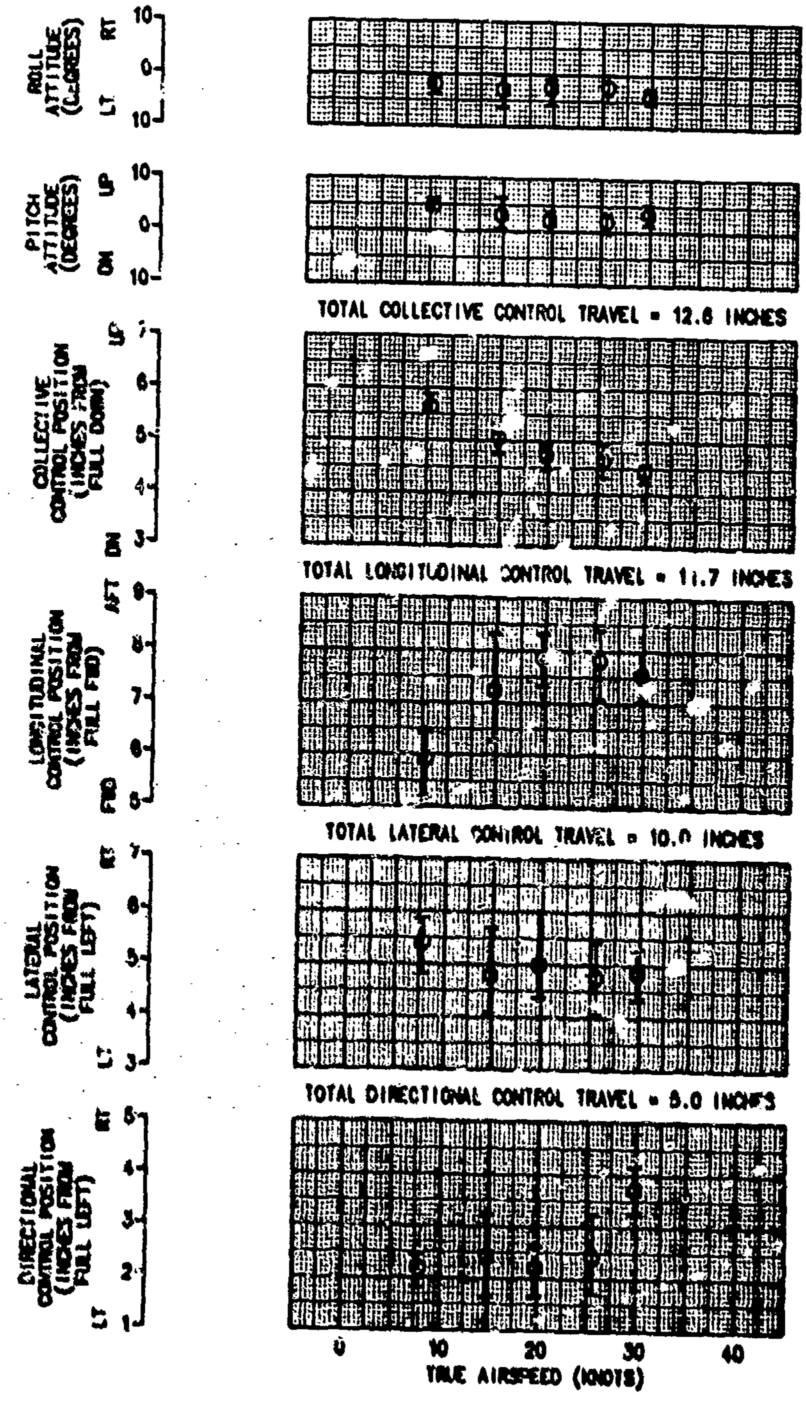


FIGURE E-174
LOW SPEED FLIGHT
280 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	107.2	0.0	3640	22.5	357	10

NOTES:
1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

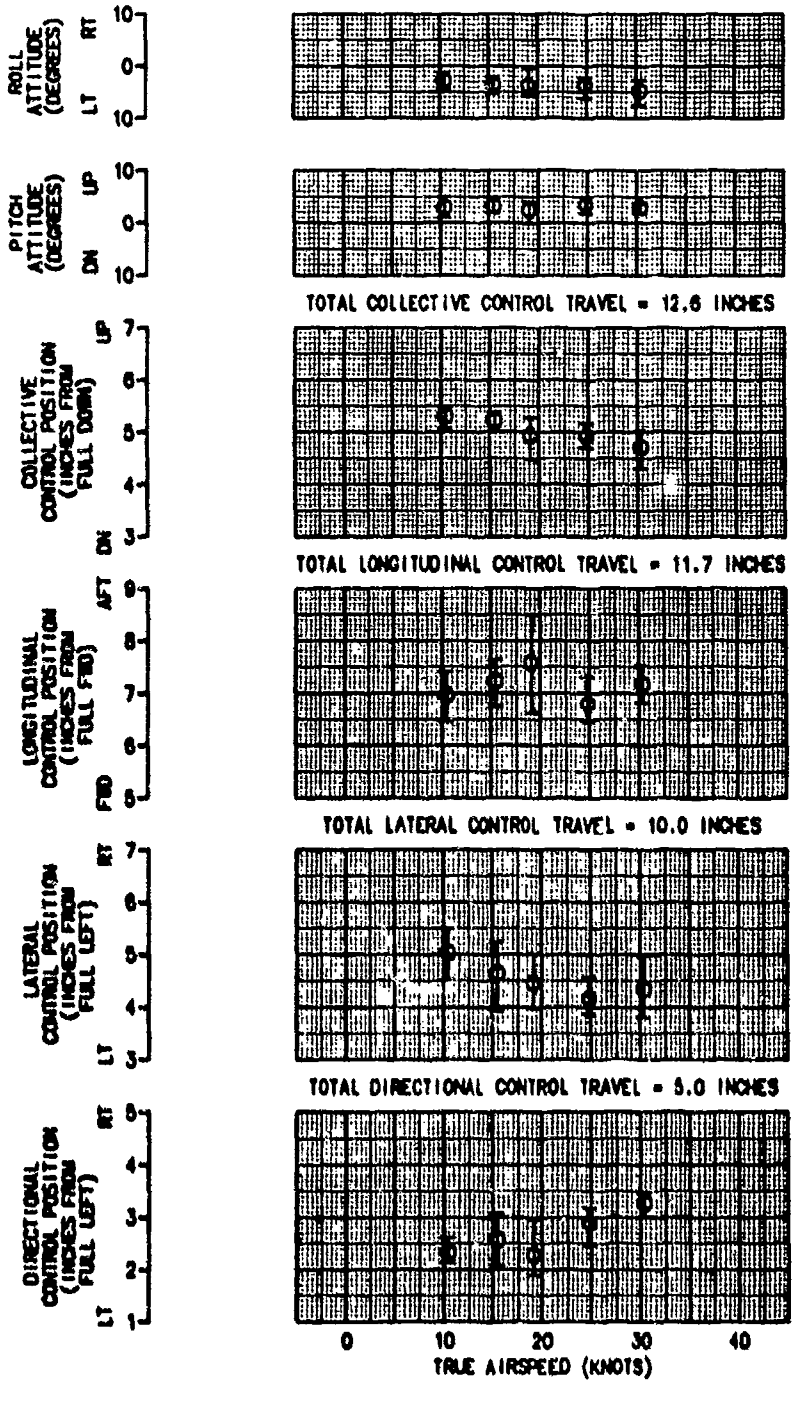


FIGURE E-175
LOW SPEED FLIGHT
280 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	107.2	0.0	3640	22.5	357	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

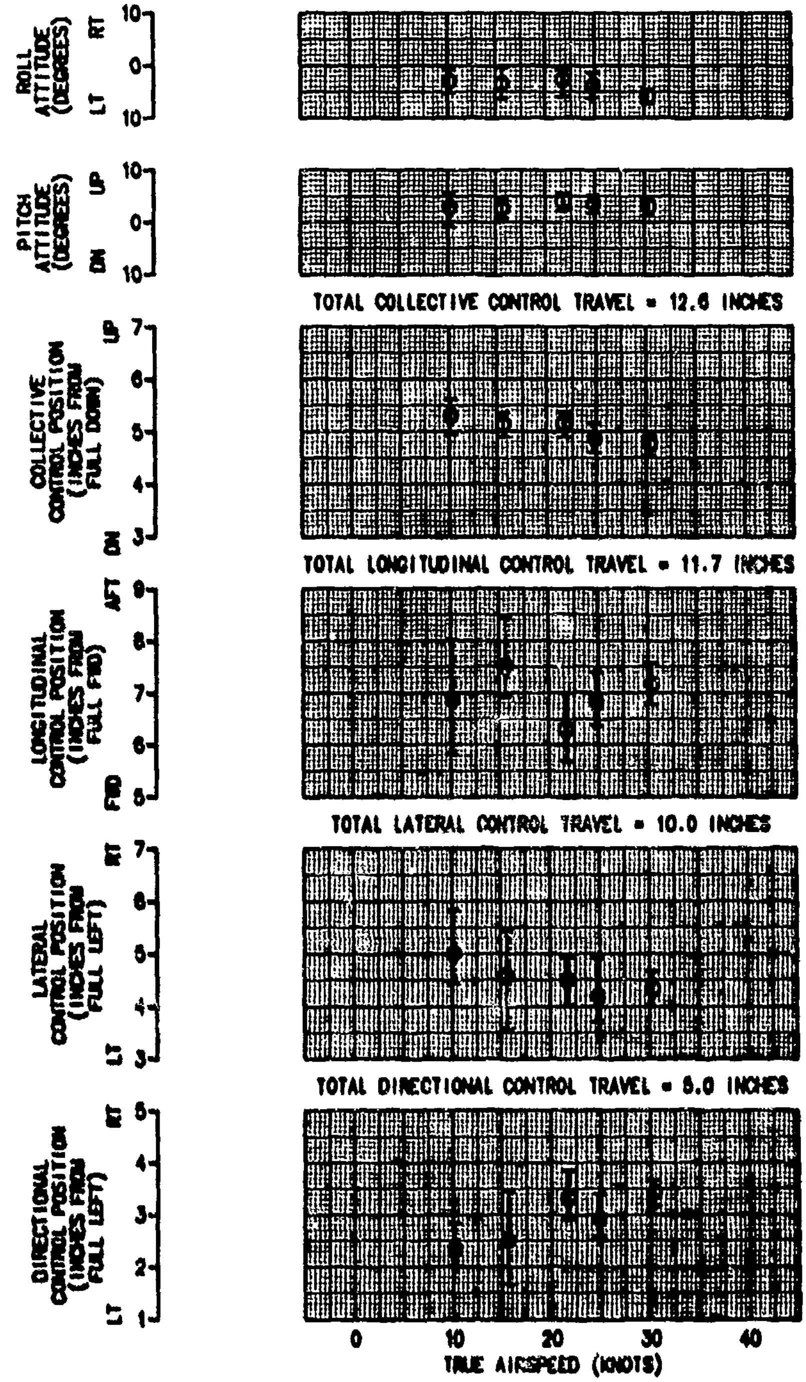


FIGURE E-176
LOW SPEED FLIGHT
290 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
3000	106.8	0.0	3630	22.5	356	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

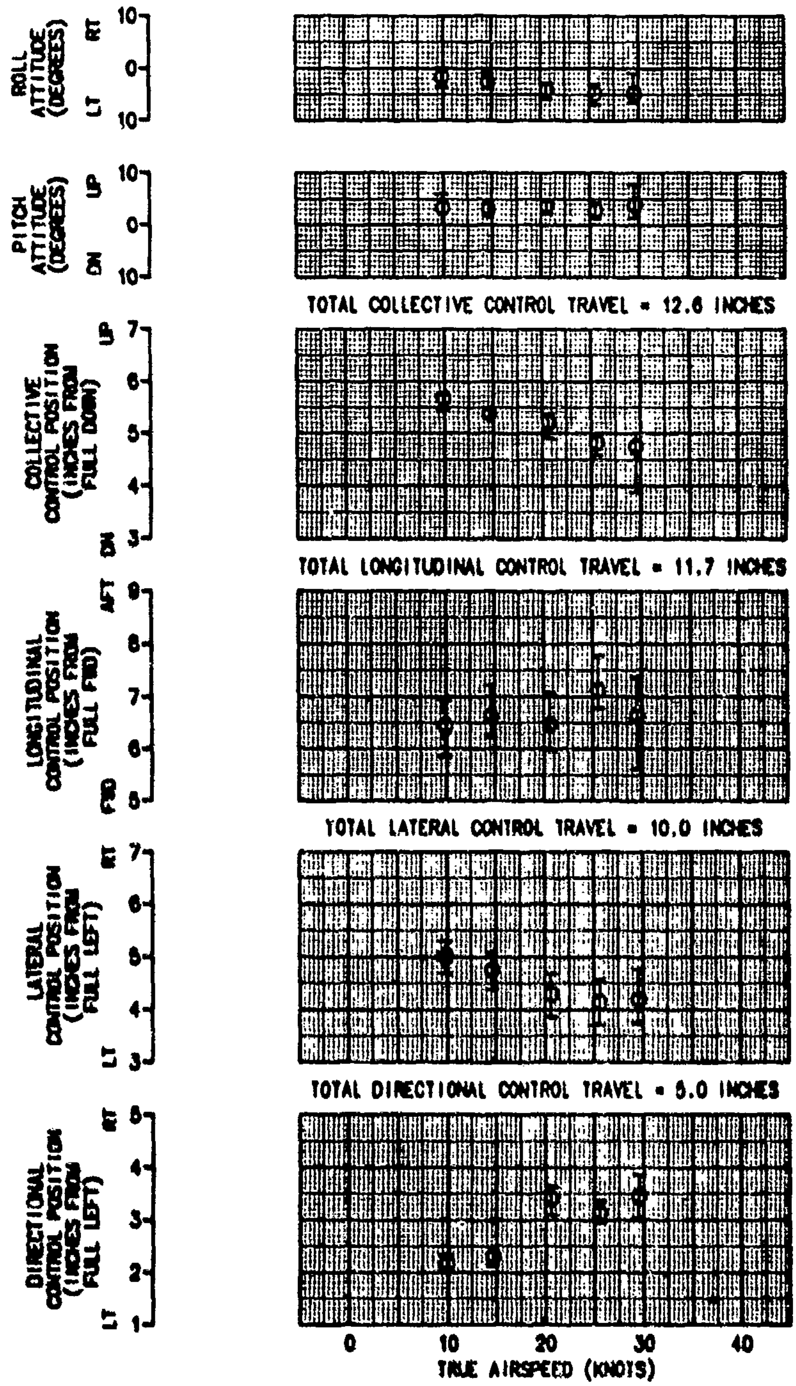


FIGURE E-177
LOW SPEED FLIGHT
290 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	106.8	0.0	3660	22.5	356	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

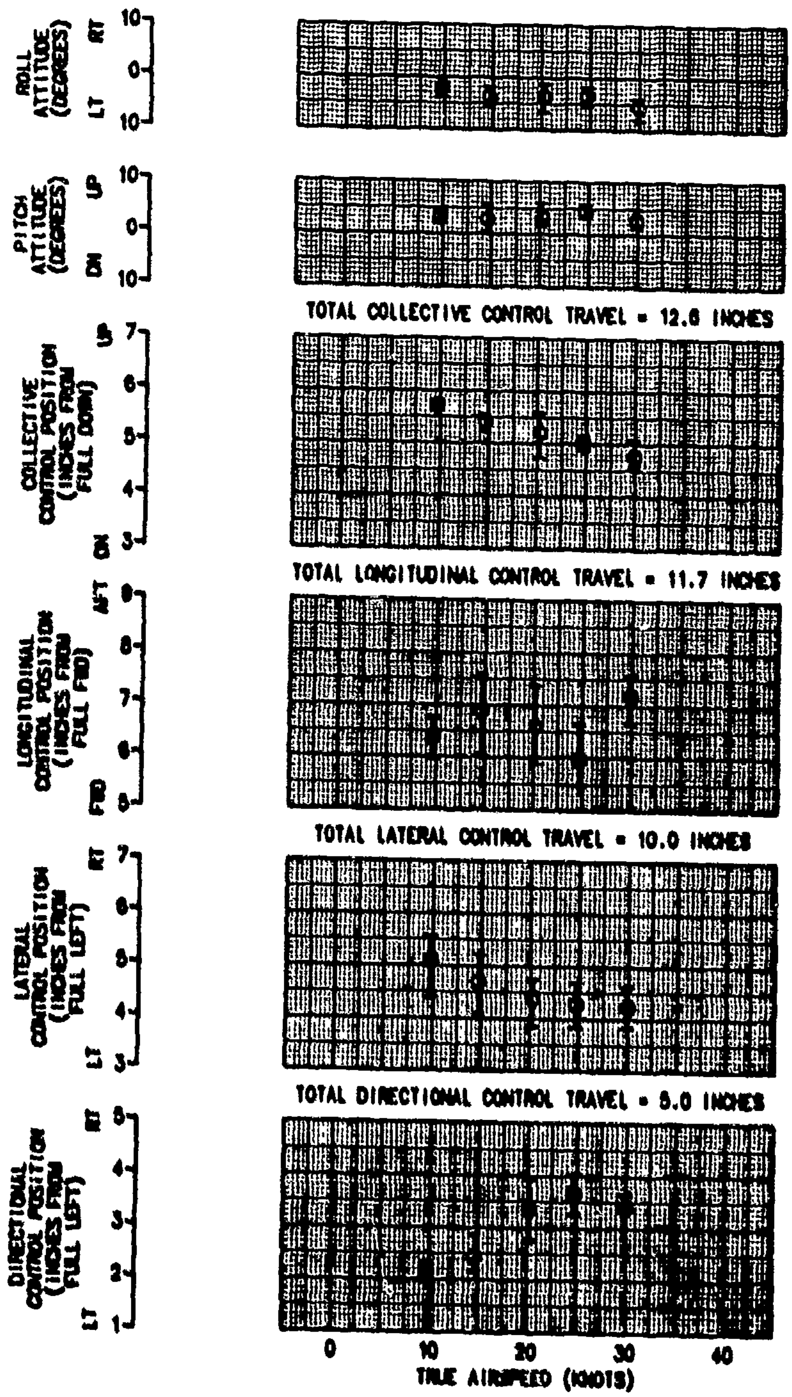


FIGURE E-178
LOW SPEED FLIGHT
300 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	106.4	0.0	3720	23.0	358	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

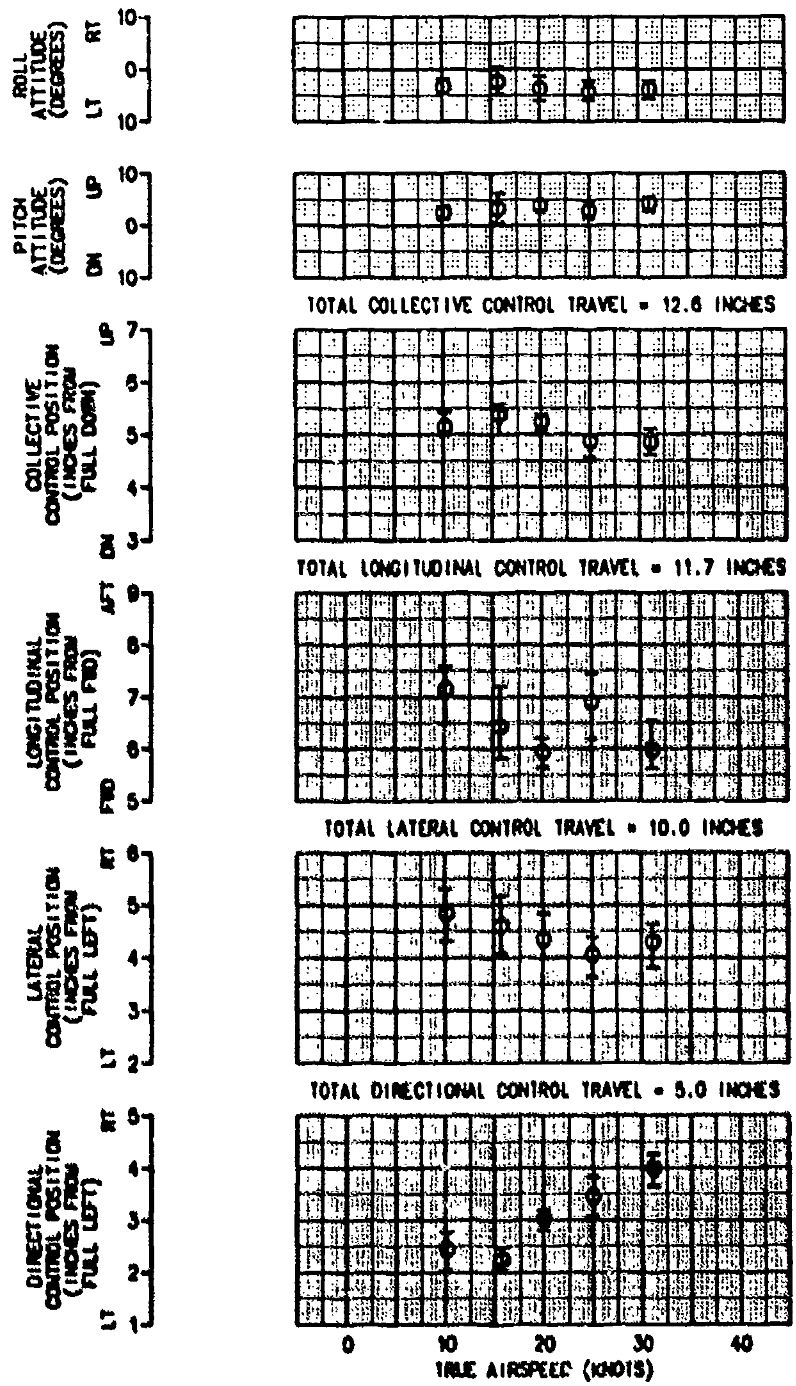


FIGURE E-179
LOW SPEED FLIGHT
300 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	106.4	0.0	3740	23.5	356	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

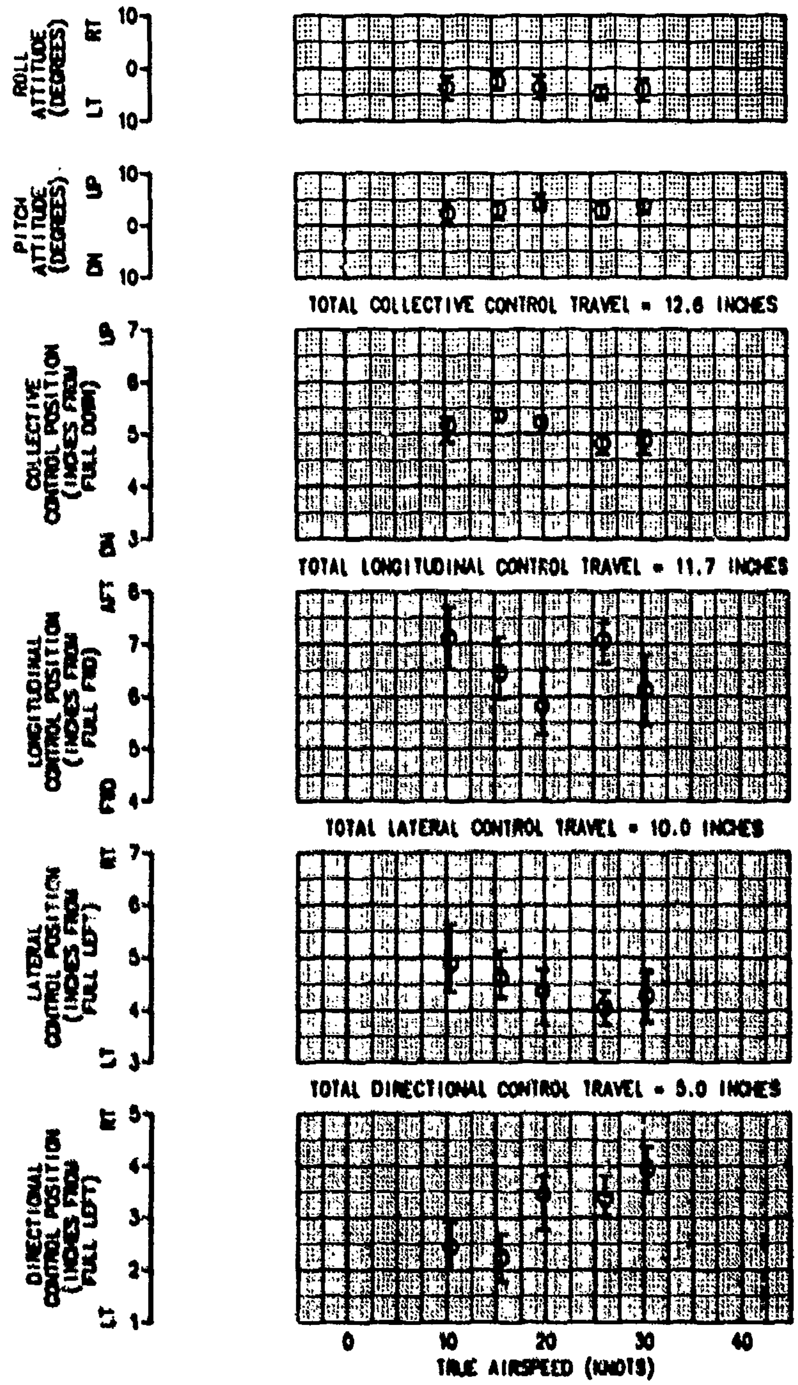


FIGURE E-180
LOW SPEED FLIGHT
310 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	108.1	0.0	3980	24.5	351	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

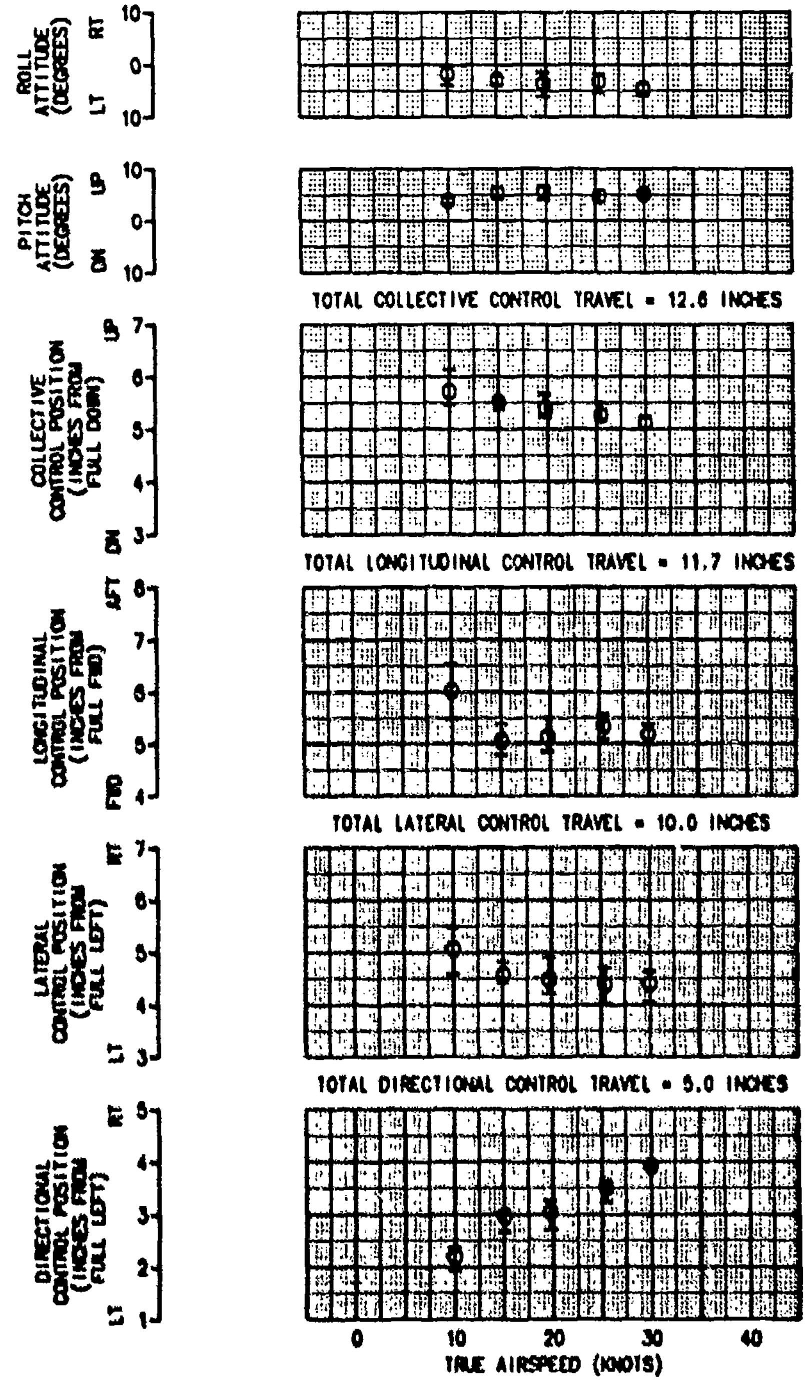


FIGURE E-181
LOW SPEED FLIGHT
310 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	108.1	0.0	3950	24.5	351	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

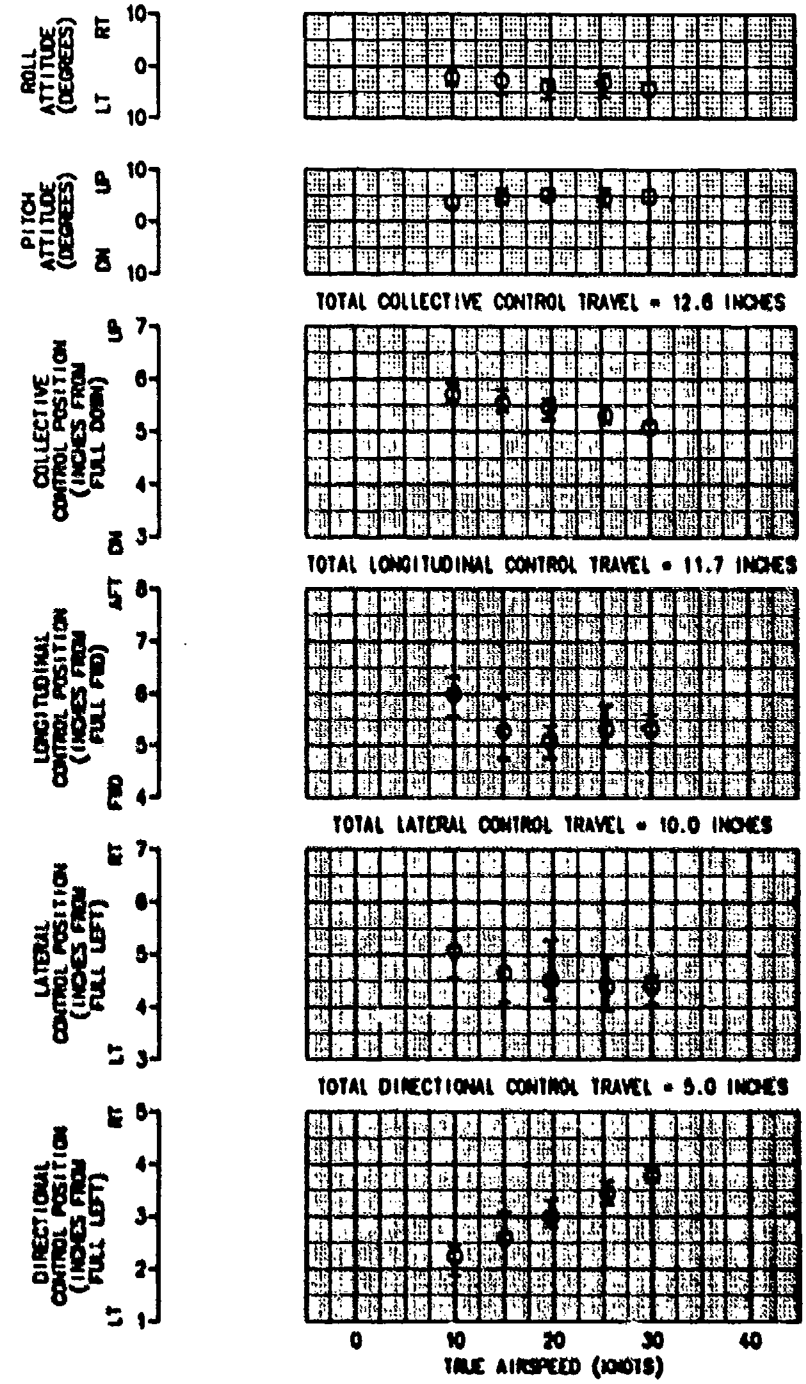


FIGURE E-182
LOW SPEED FLIGHT
320 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2980	107.7	0.0	3980	24.5	351	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

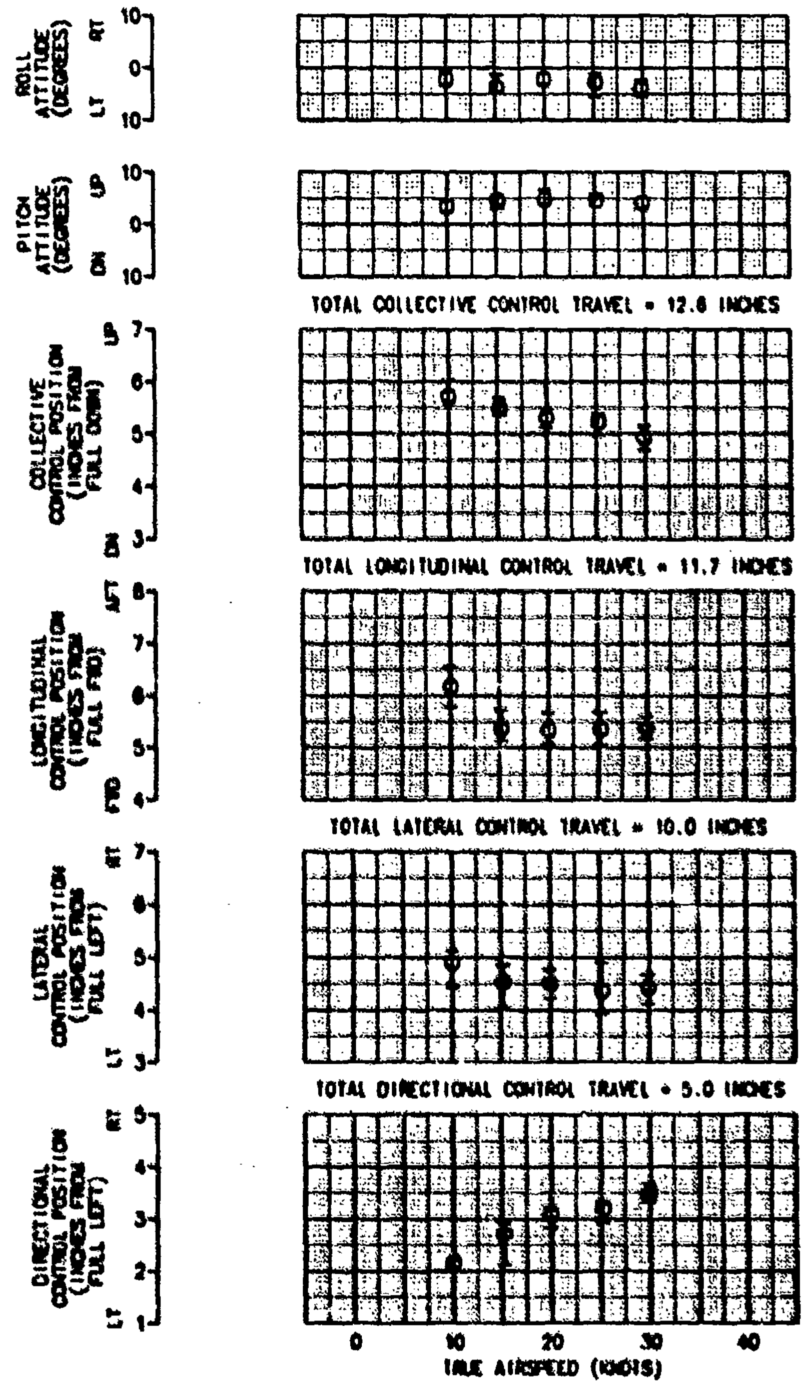


FIGURE E-183
LOW SPEED FLIGHT
320 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2980	107.7	0.0	3980	24.5	351	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

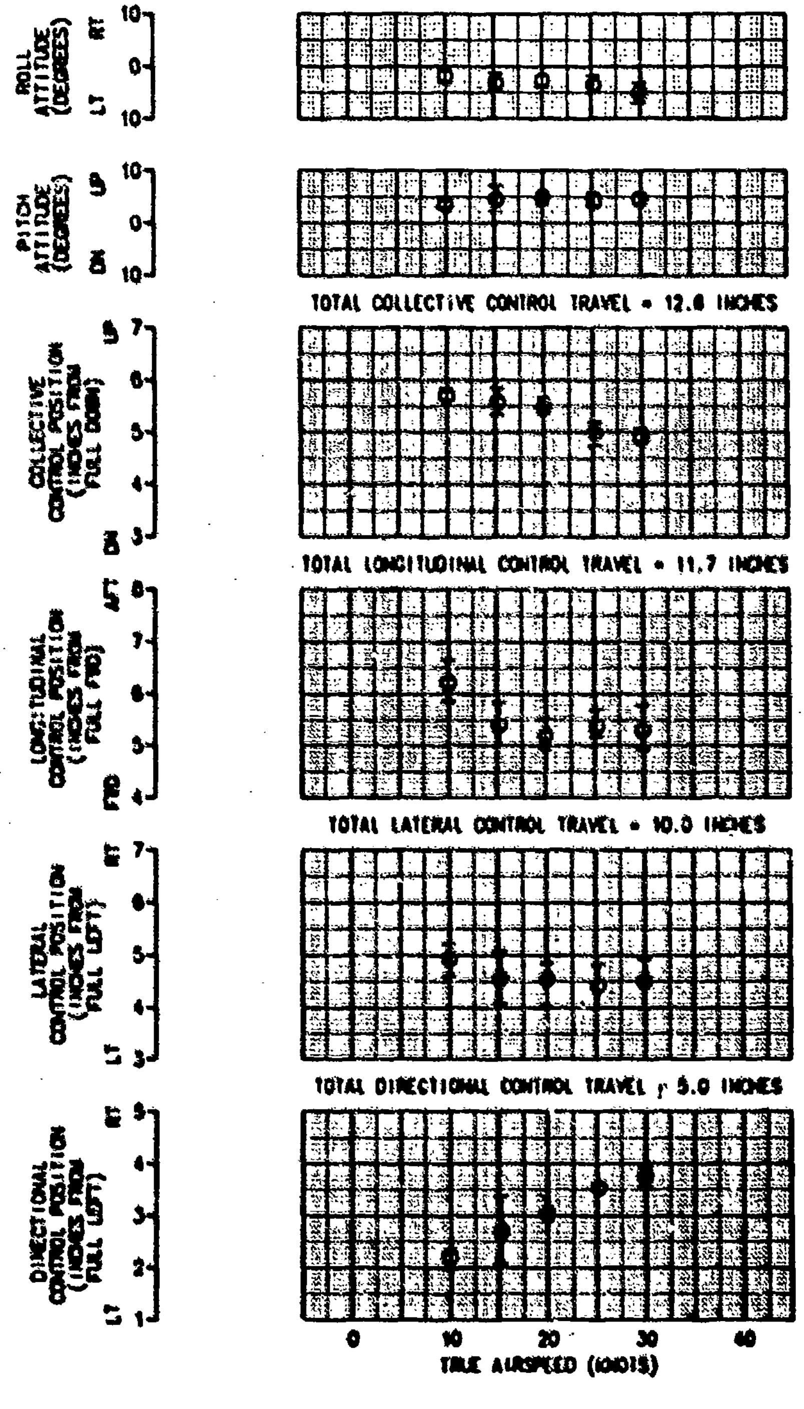


FIGURE E-184
LOW SPEED FLIGHT
330 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
3000	107.2	0.0	4050	25.5	350	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

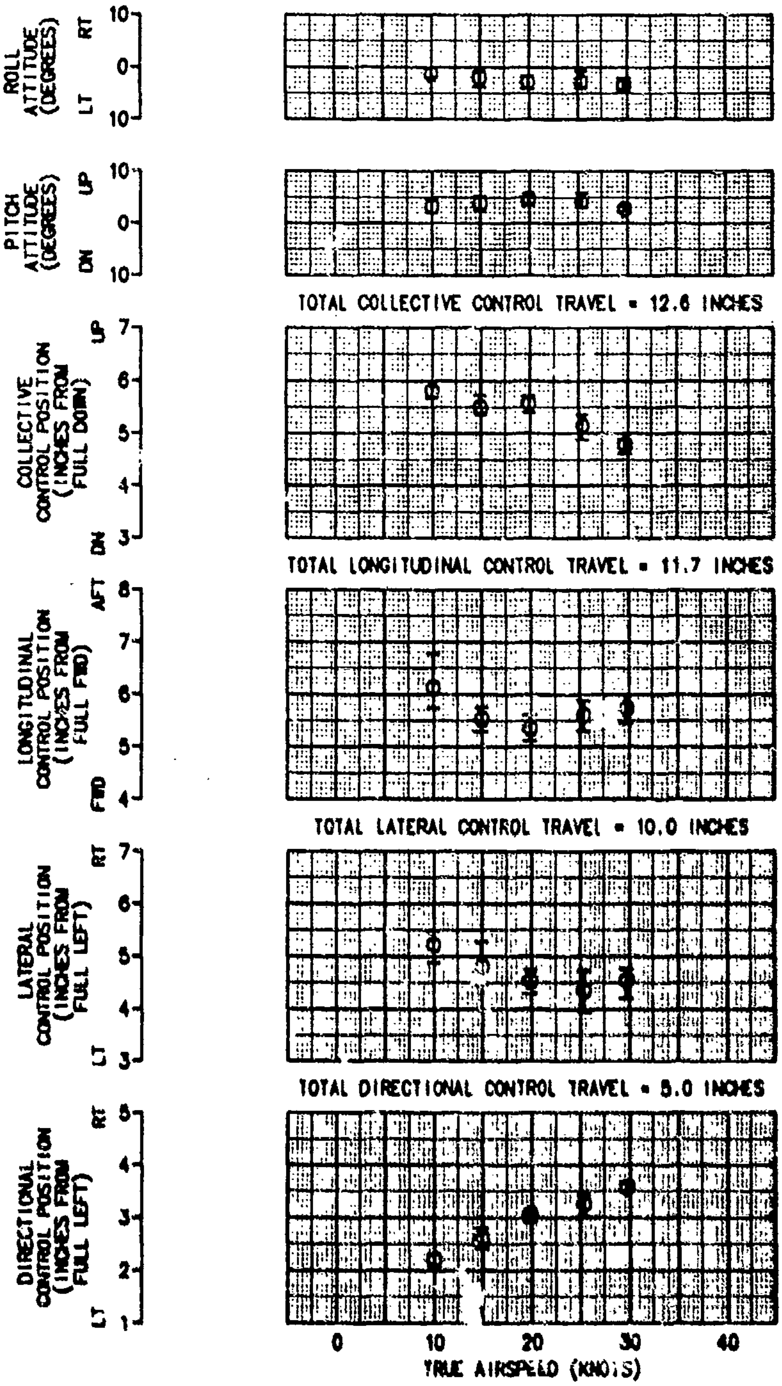


FIGURE E-185
LOW SPEED FLIGHT
330 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
3000	107.2	0.0	4050	25.5	351	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

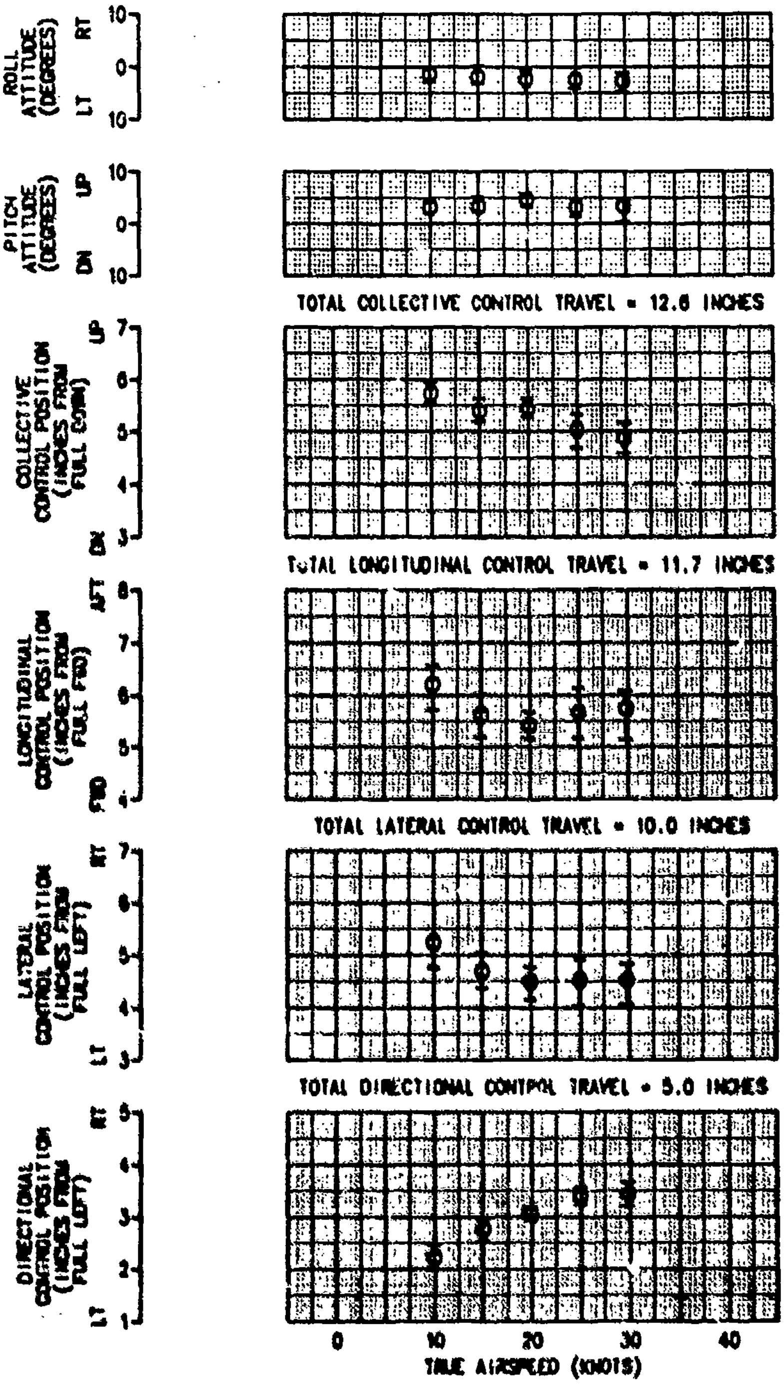


FIGURE E-186
LOW SPEED FLIGHT
340 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2090	106.9	0.0	4100	25.5	352	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

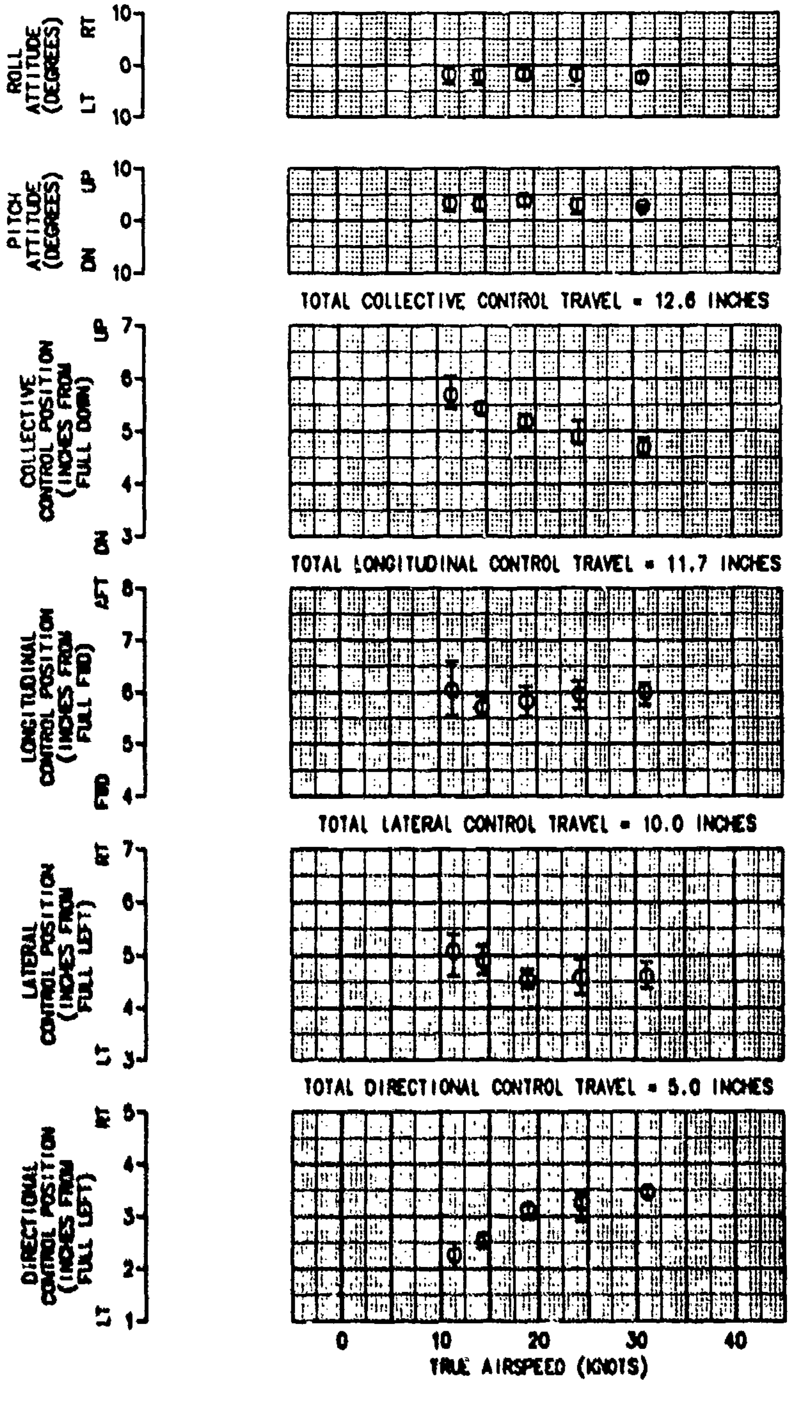


FIGURE E-187
LOW SPEED FLIGHT
340 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2990	106.9	0.0	4090	25.5	352	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

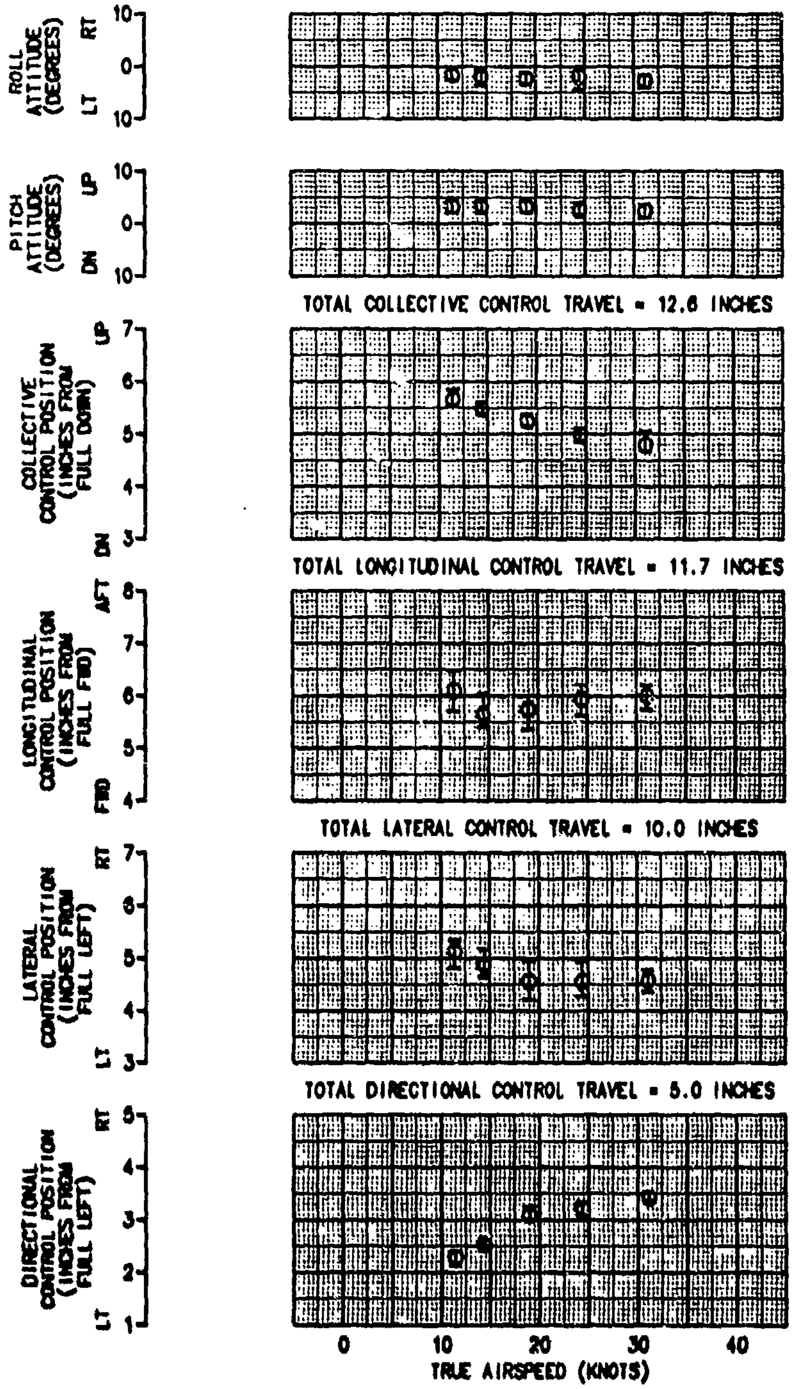


FIGURE E-188
LOW SPEED FLIGHT
350 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2980	106.7	0.0	4120	26.0	353	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

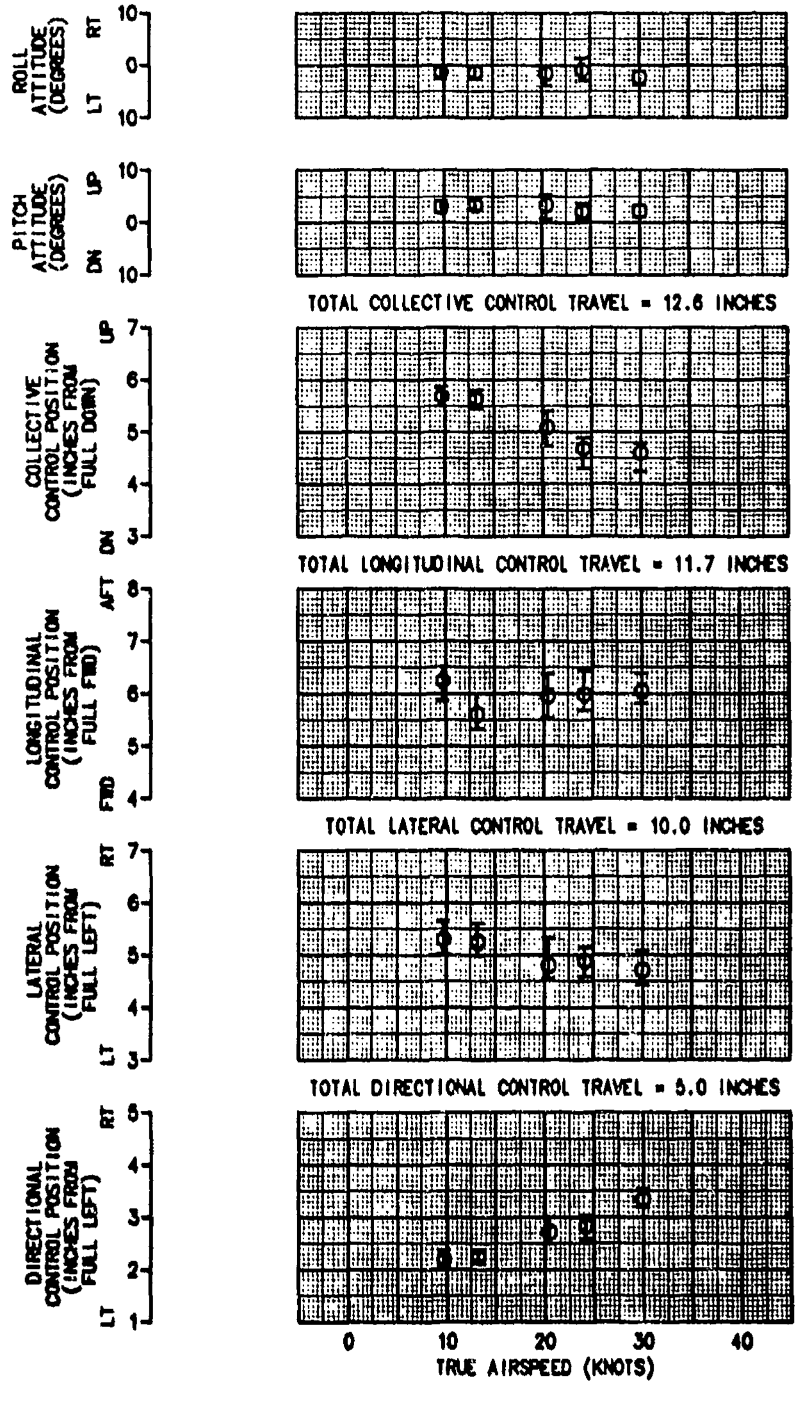


FIGURE E-189
LOW SPEED FLIGHT
350 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2980	106.7	0.0	4120	26.0	353	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

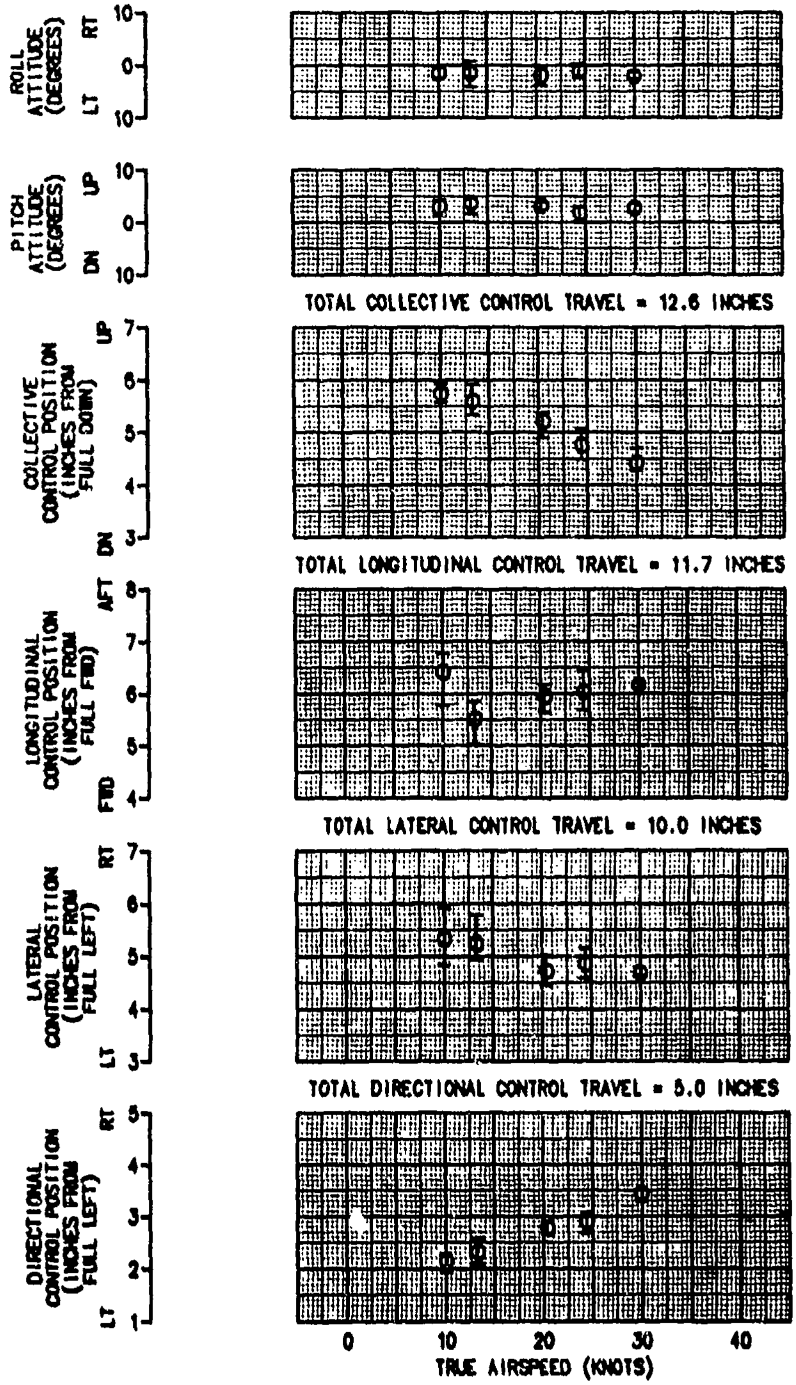


FIGURE E-190
LOW SPEED FLIGHT
120 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2950	107.9	0.0	3760	22.5	352	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS OFF, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

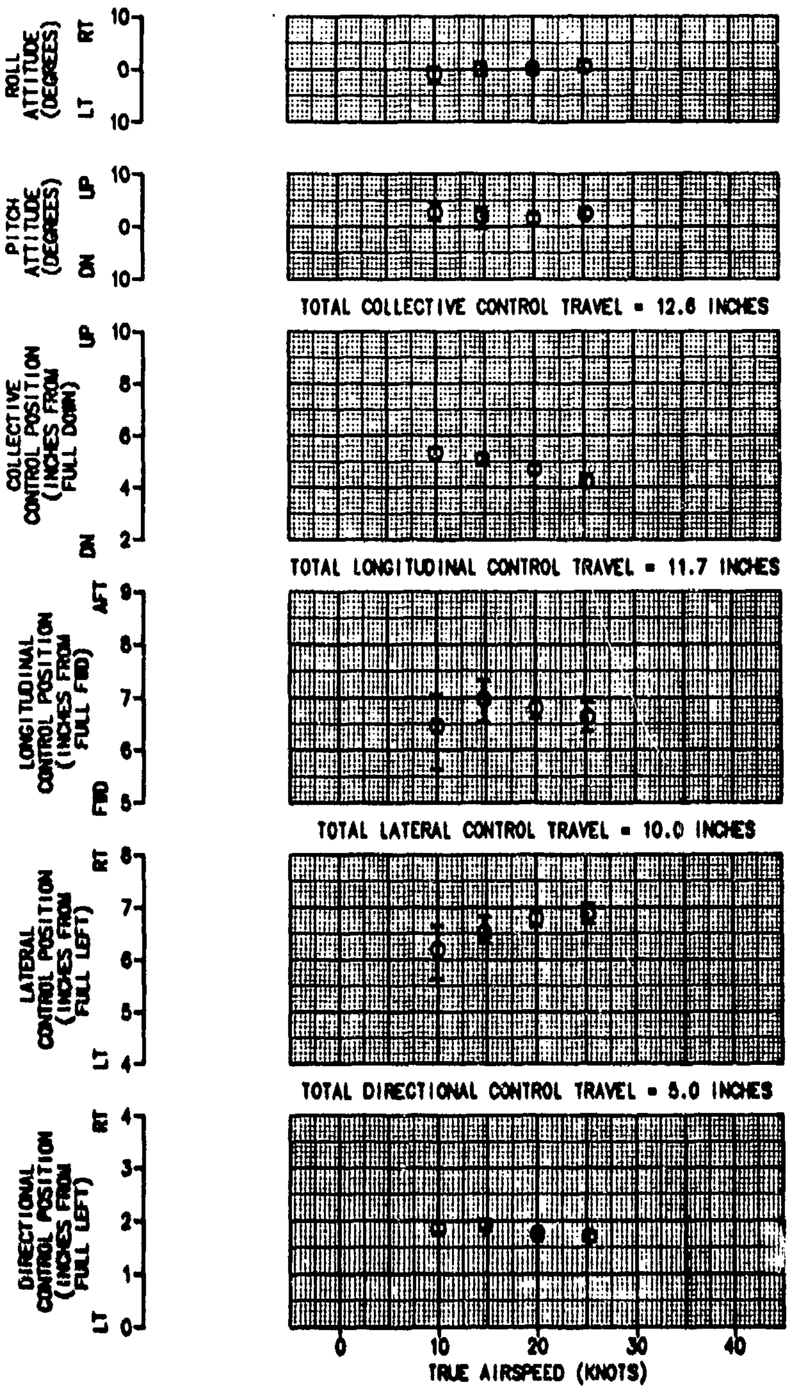


FIGURE E-191
LOW SPEED FLIGHT
180 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2940	107.8	0.0	3900	24.0	353	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS OFF, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

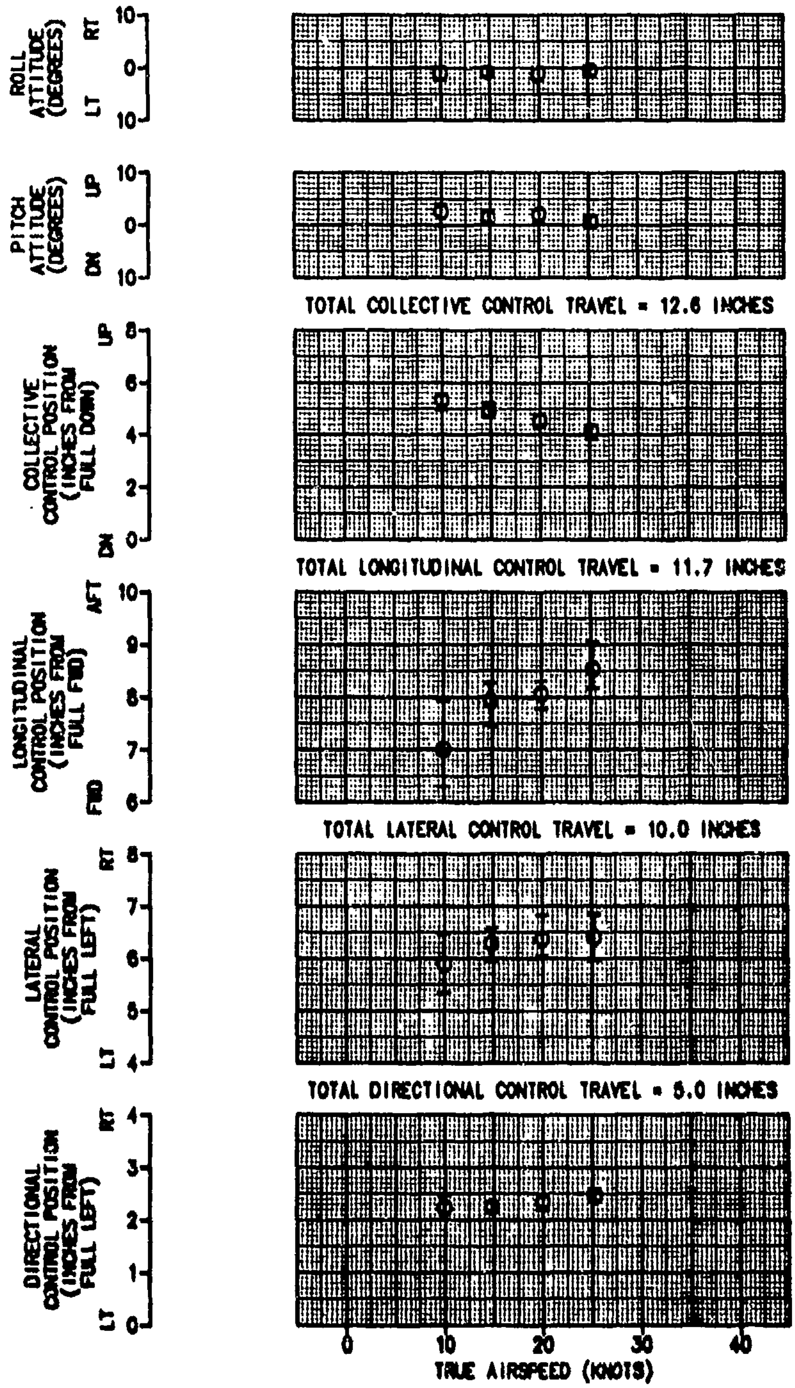


FIGURE E-192
LOW SPEED FLIGHT
240 DEGREE AZIMUTH
JOH-58C S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	SKID HEIGHT (FT)
2950	107.4	0.0	3960	24.5	356	10

NOTES: 1. CONFIGURATION: CLEAN, DOORS OFF, SAS ON
2. I DENOTES CONTROL AND ATTITUDE EXCURSIONS
3. WIND CONDITIONS: 5 KNOTS OR LESS

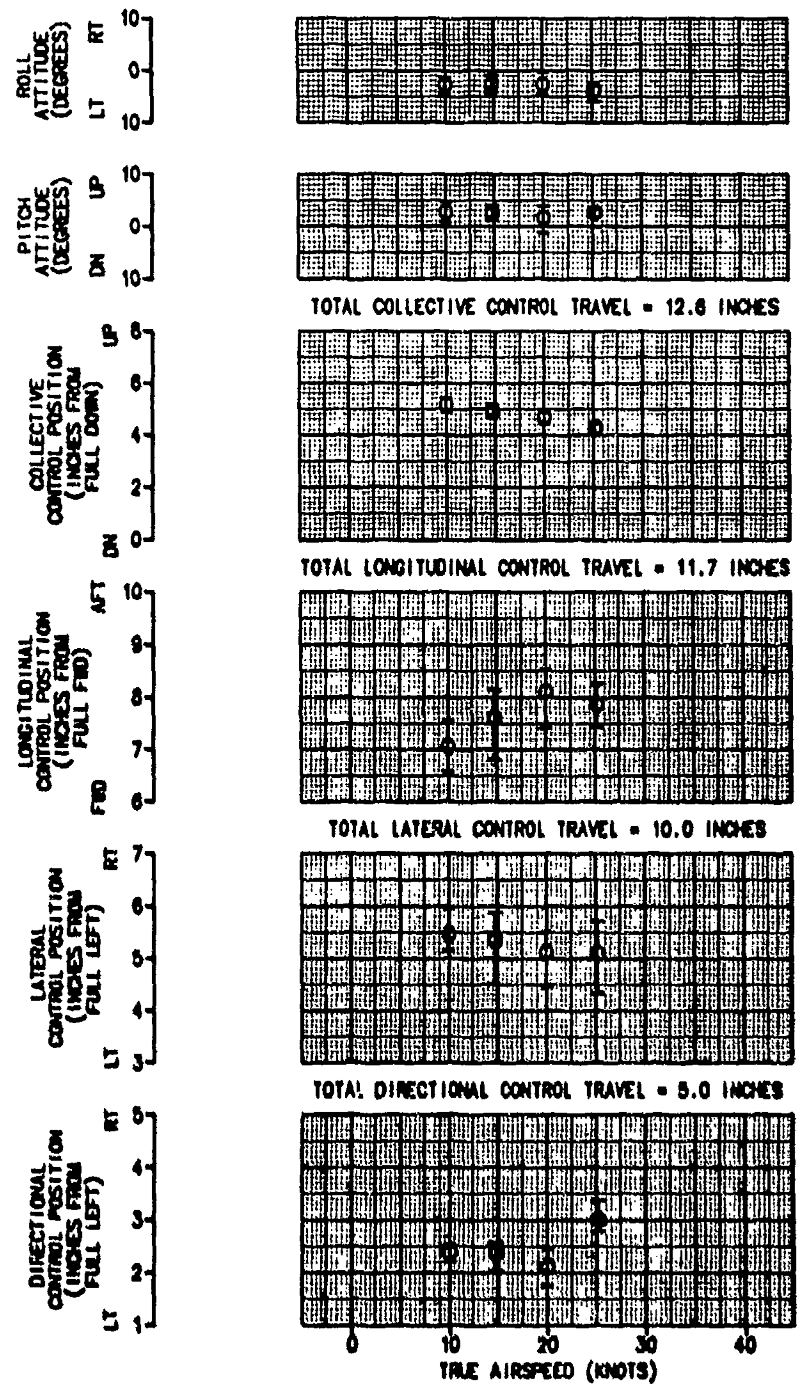


FIGURE E-193
LOW SPEED FLIGHT - LEFT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2710	111.3	0.7 RT	2610	13.0	355	6	ON

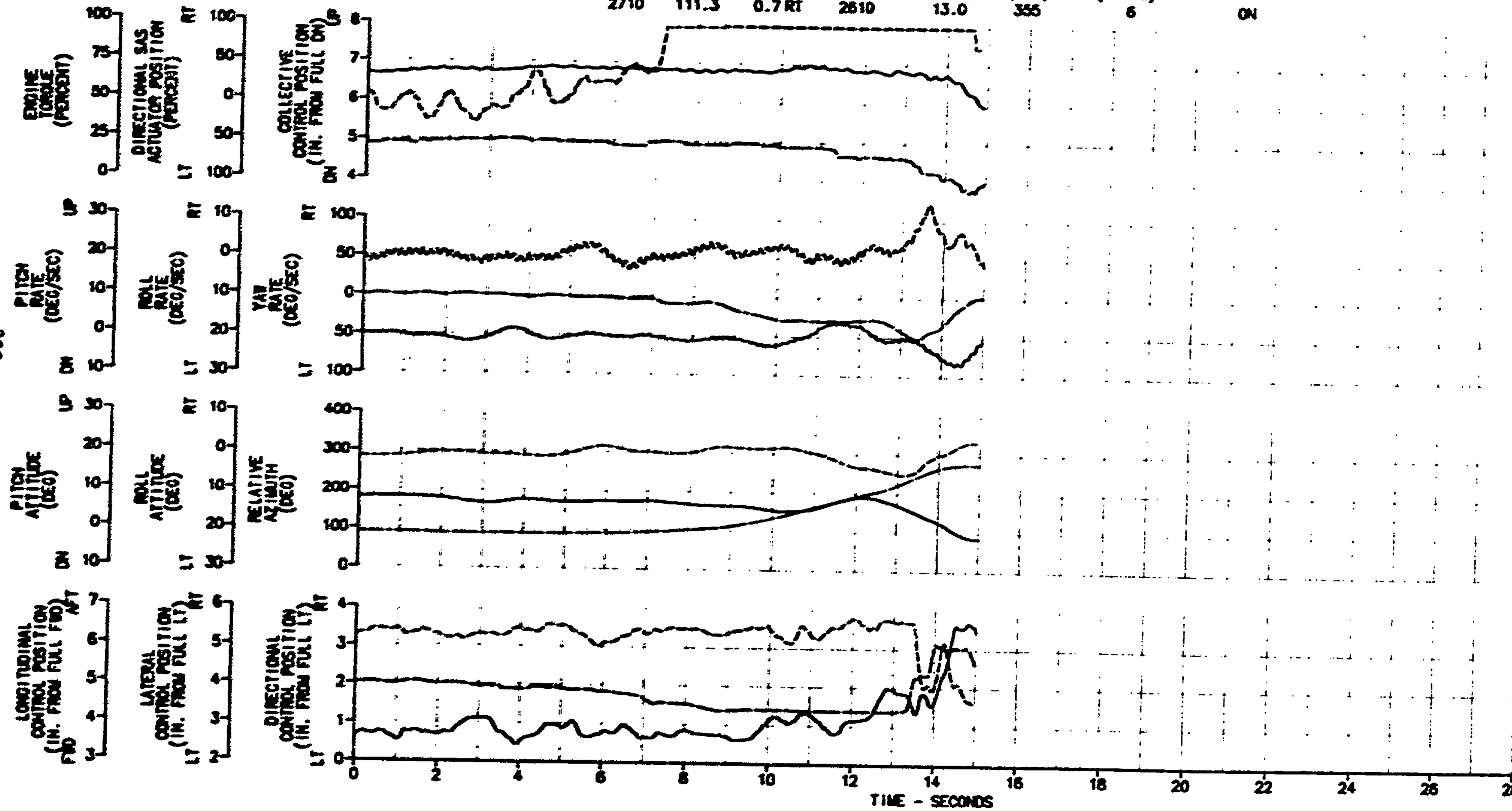


FIGURE E-194
LOW SPEED FLIGHT - LEFT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2700	111.3	0.7 RT	2570	12.5	357	5	OFF

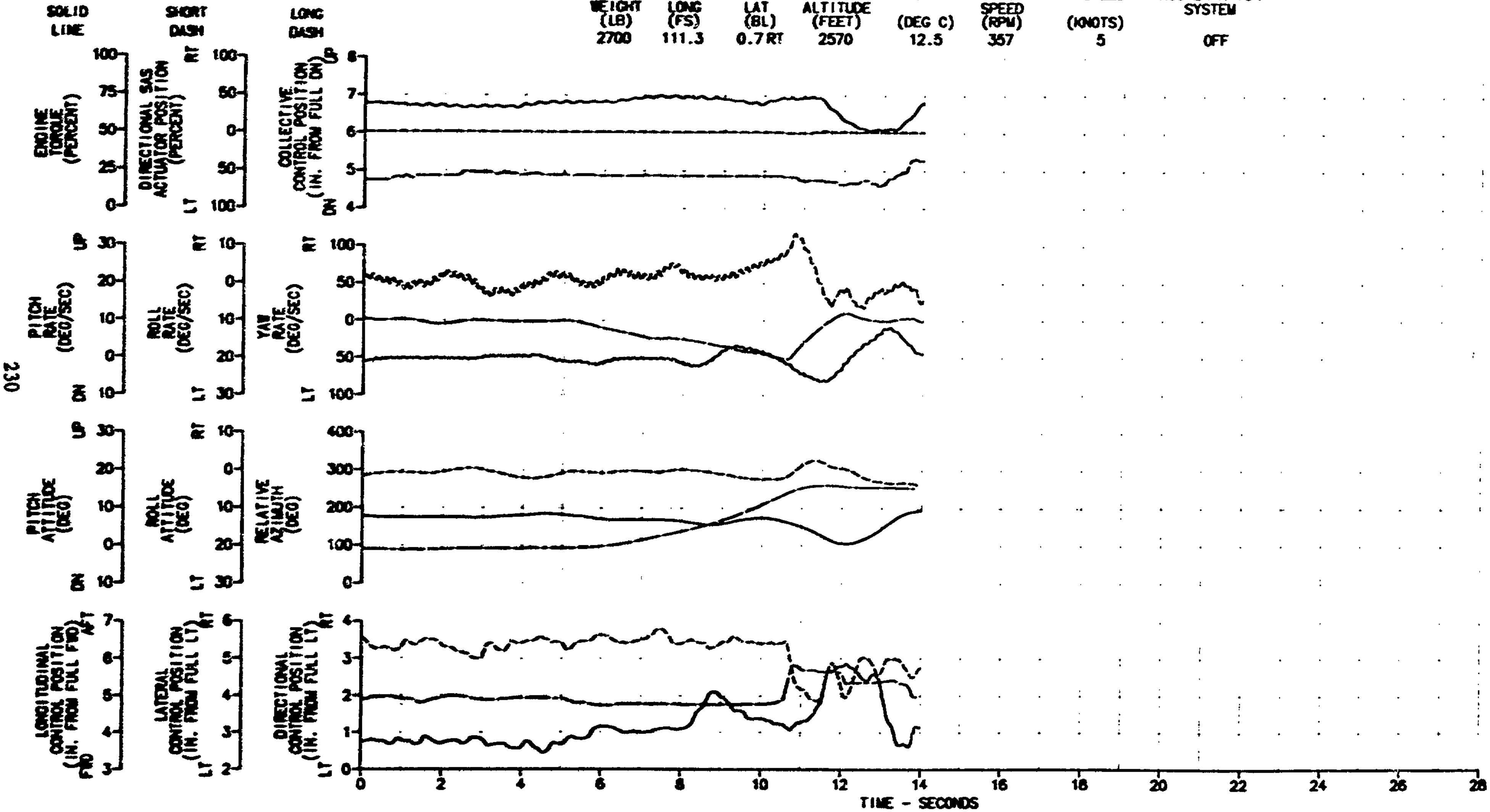


FIGURE E-195
LOW SPEED FLIGHT-RIGHT YAW RATE
JOH-58C USA S/N 70-15349

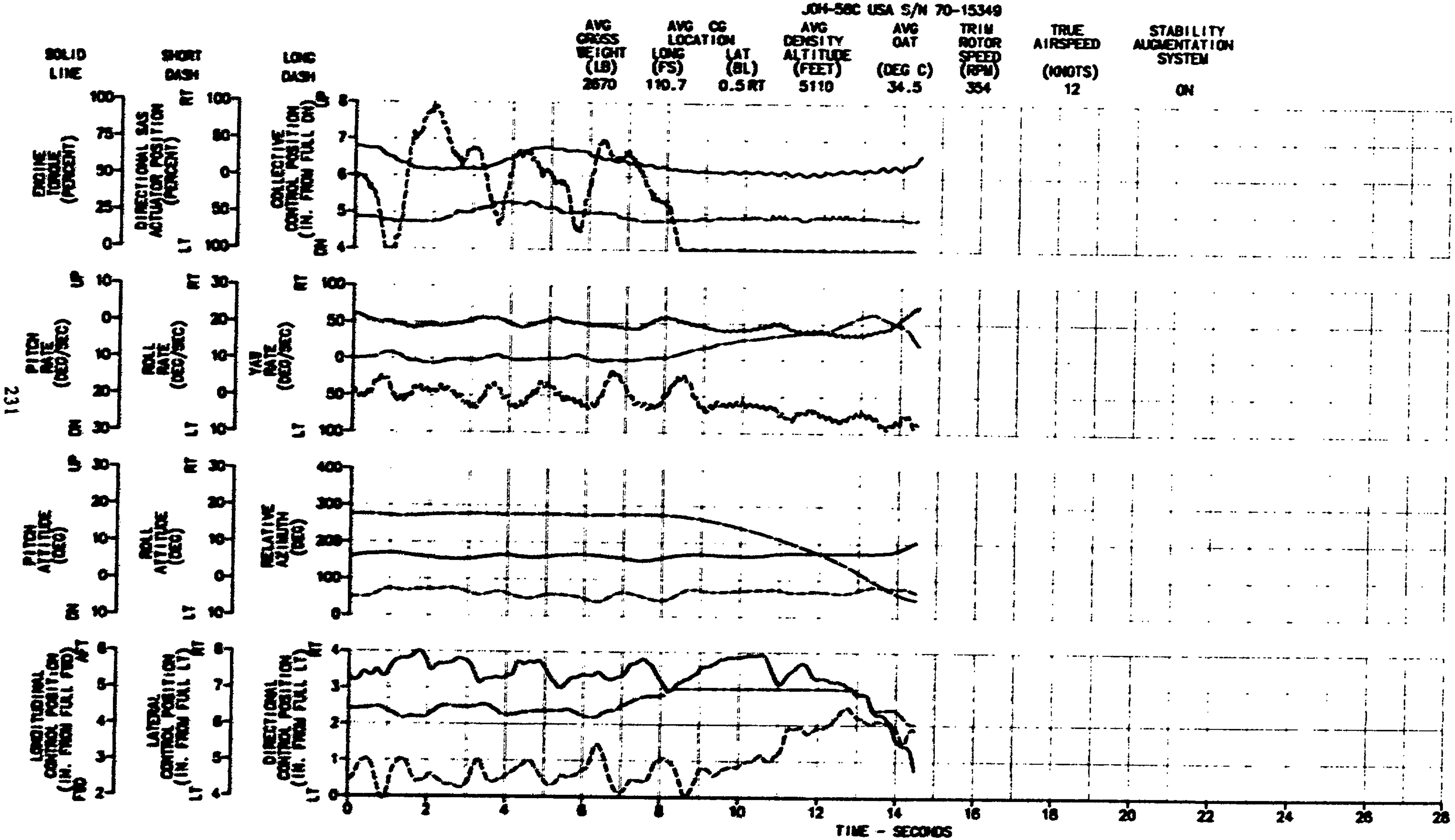


FIGURE E-196
LOW SPEED FLIGHT-RIGHT YAW RATE
JOH-58C USA S/N 70-15349

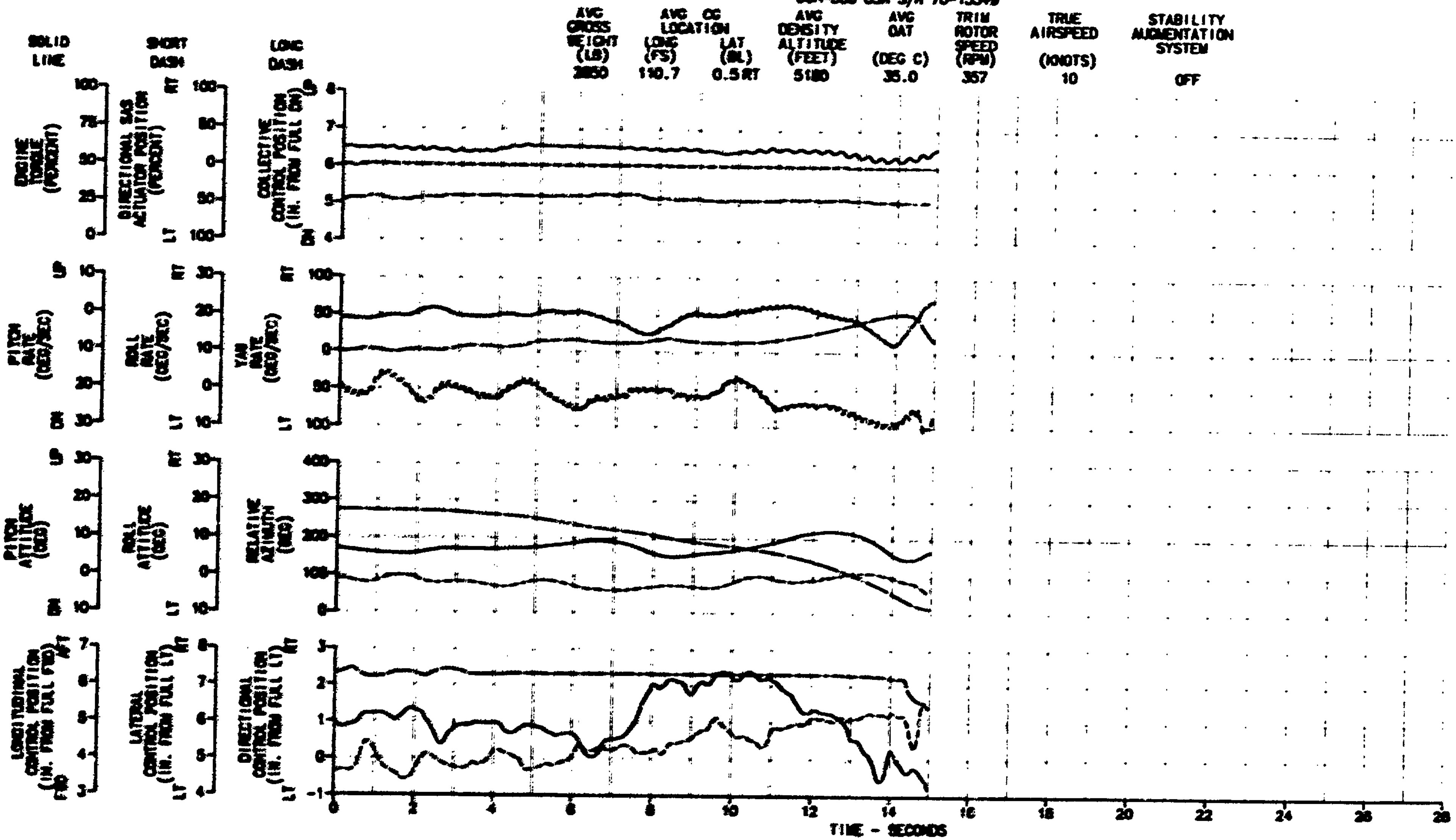


FIGURE E-197
LOW SPEED FLIGHT - LEFT YAW RATE
JOH-58C USA S/N 70-15349

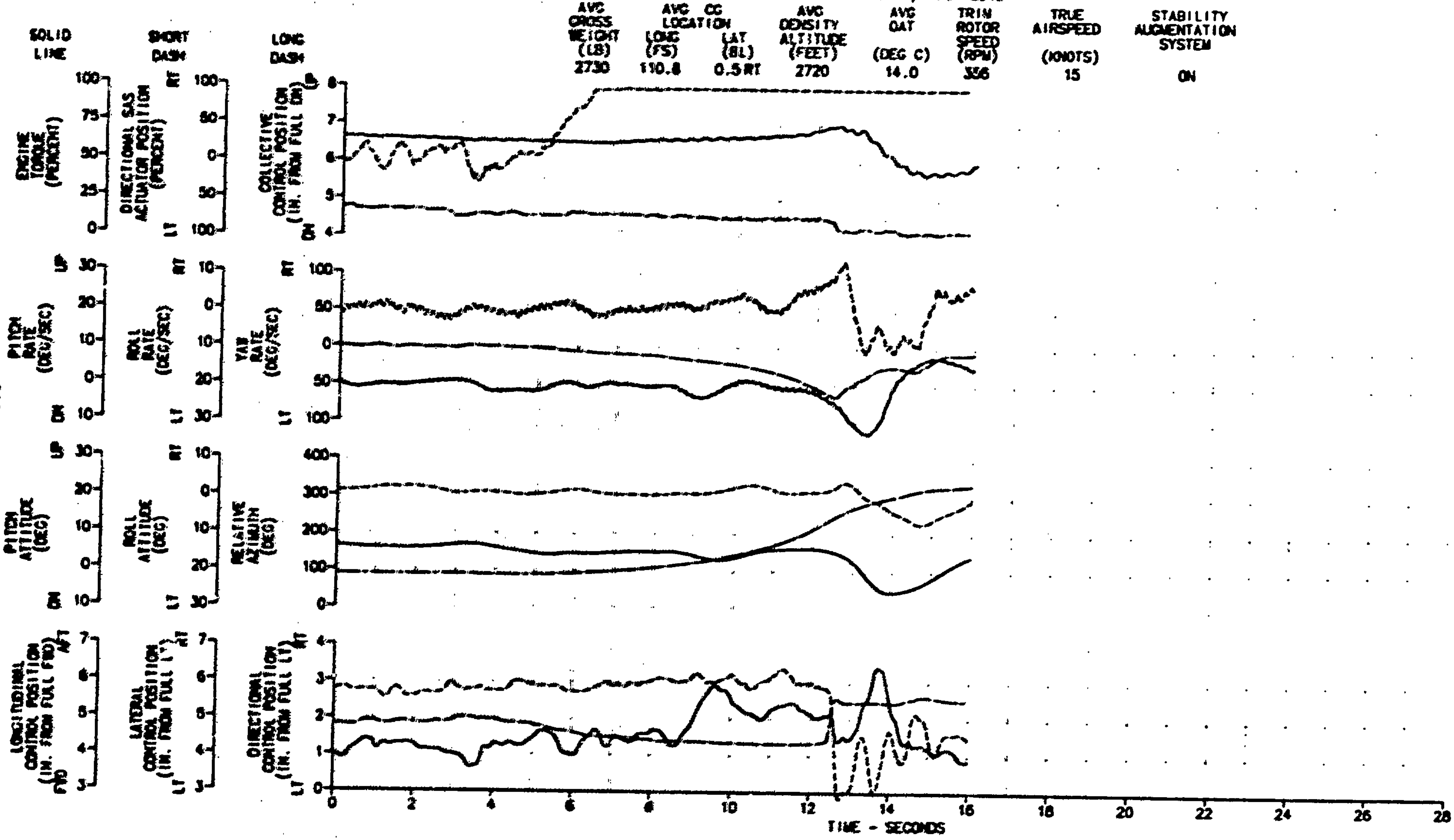


FIGURE E-198
LOW SPEED FLIGHT - LEFT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2720	110.8	0.5 RT	2540	12.5	357	13	OFF

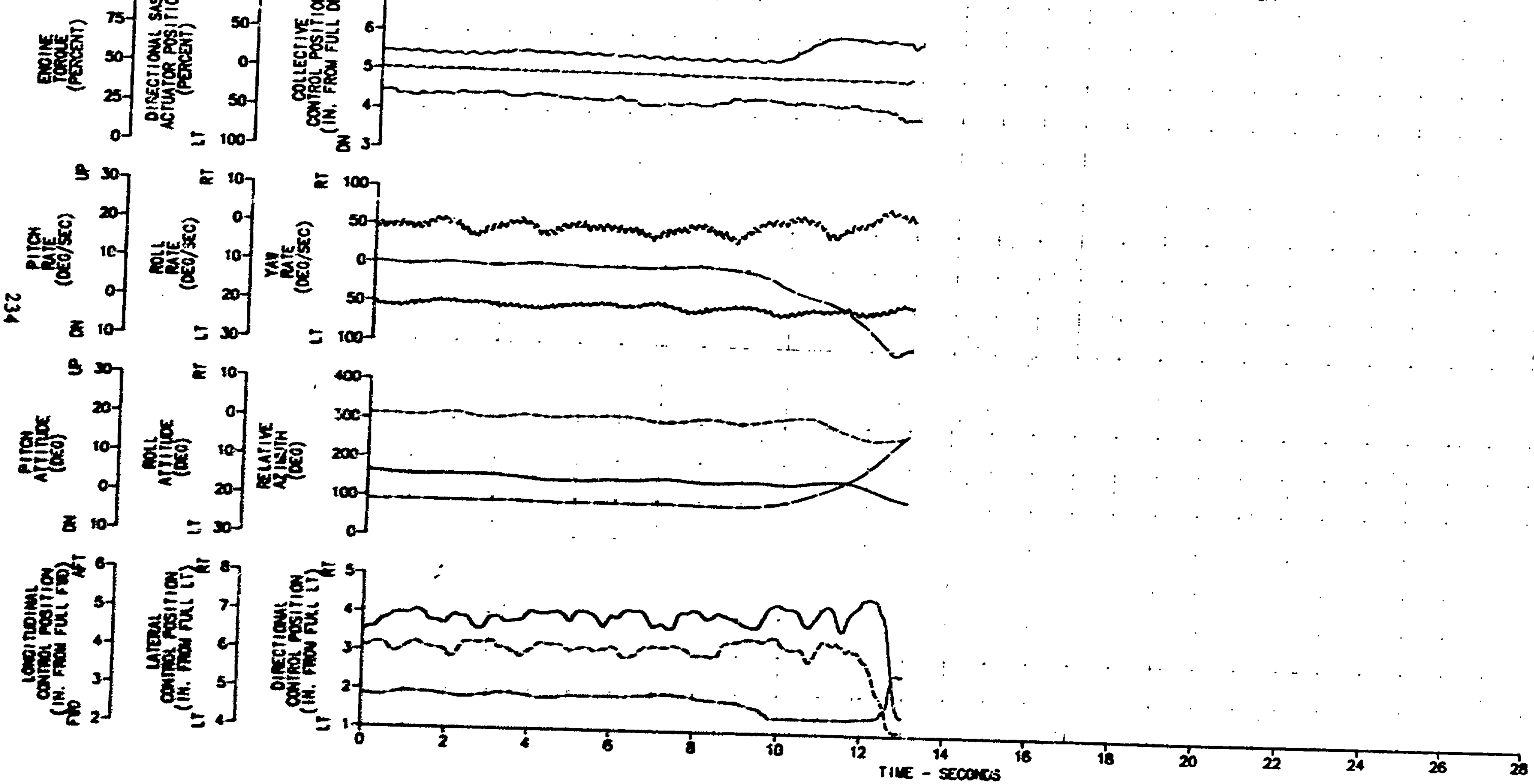


FIGURE E-199
LOW SPEED FLIGHT-RIGHT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	110.2	0.3 RT	5110	34.5	354	15	ON

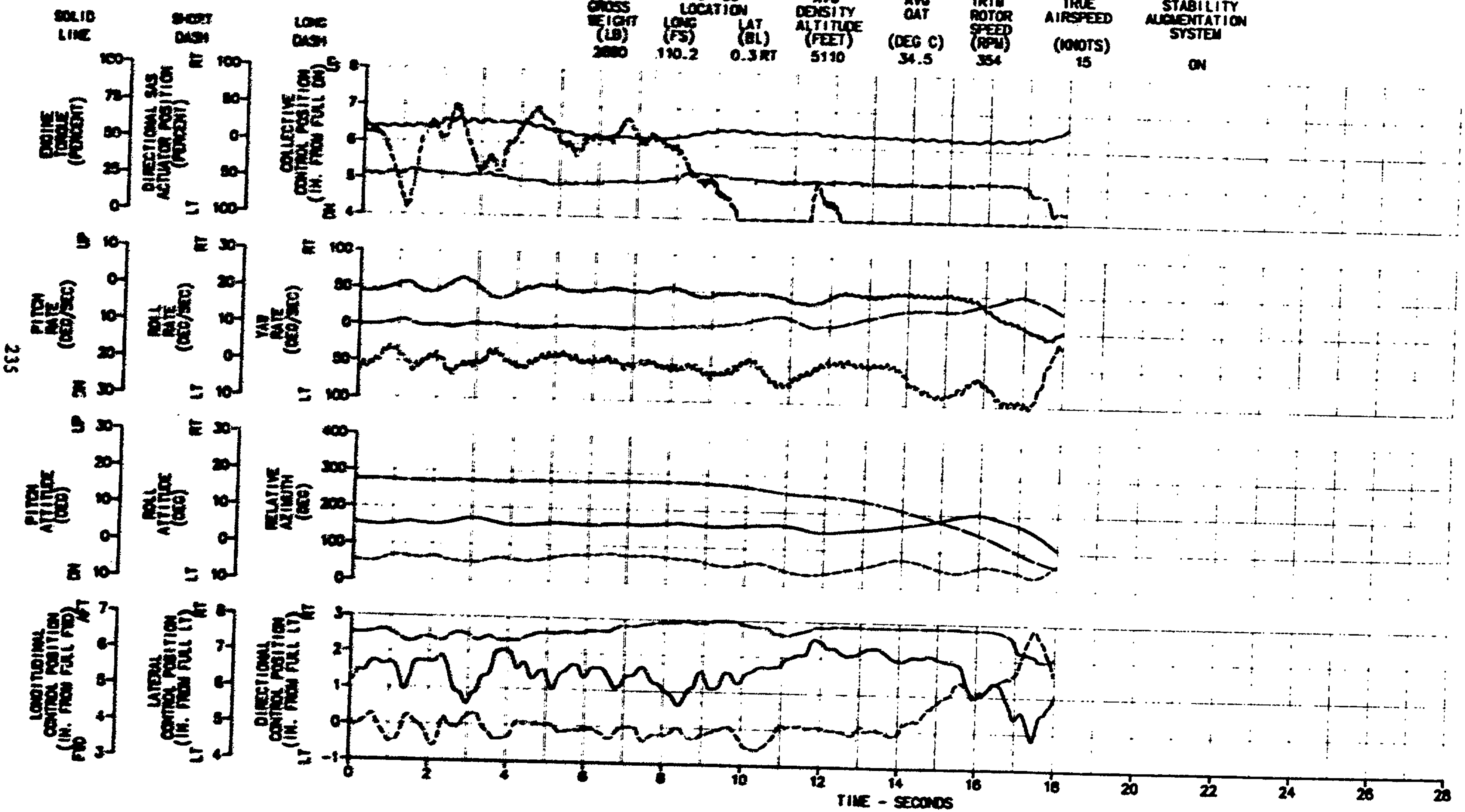


FIGURE E-200
LOW SPEED FLIGHT-RIGHT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	110.2	0.3 RT	5150	35.0	339	15	OFF

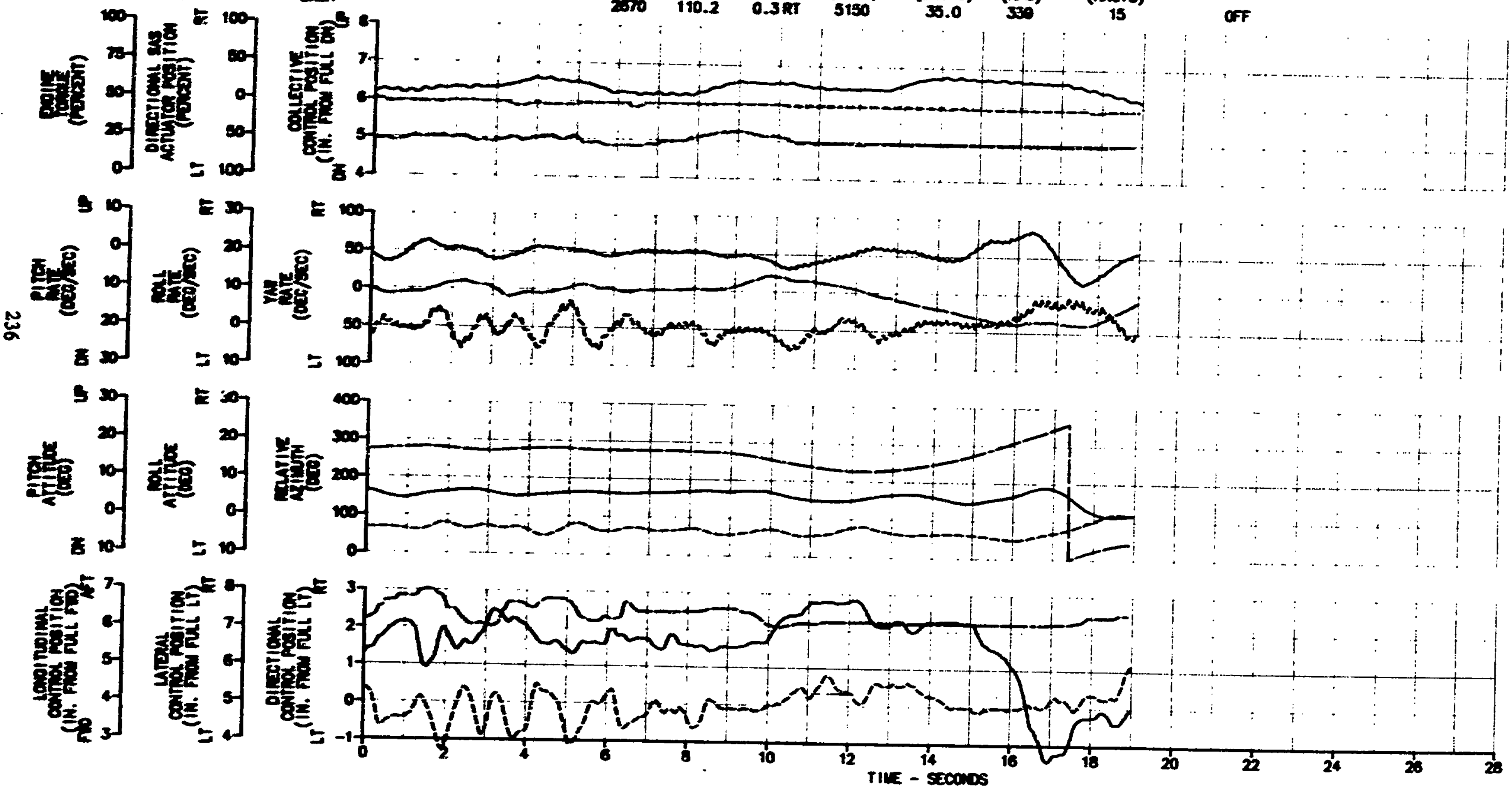


FIGURE E-201
LOW SPEED FLIGHT - LEFT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2700	110.8	0.5 RT	2450	11.5	356	20	ON

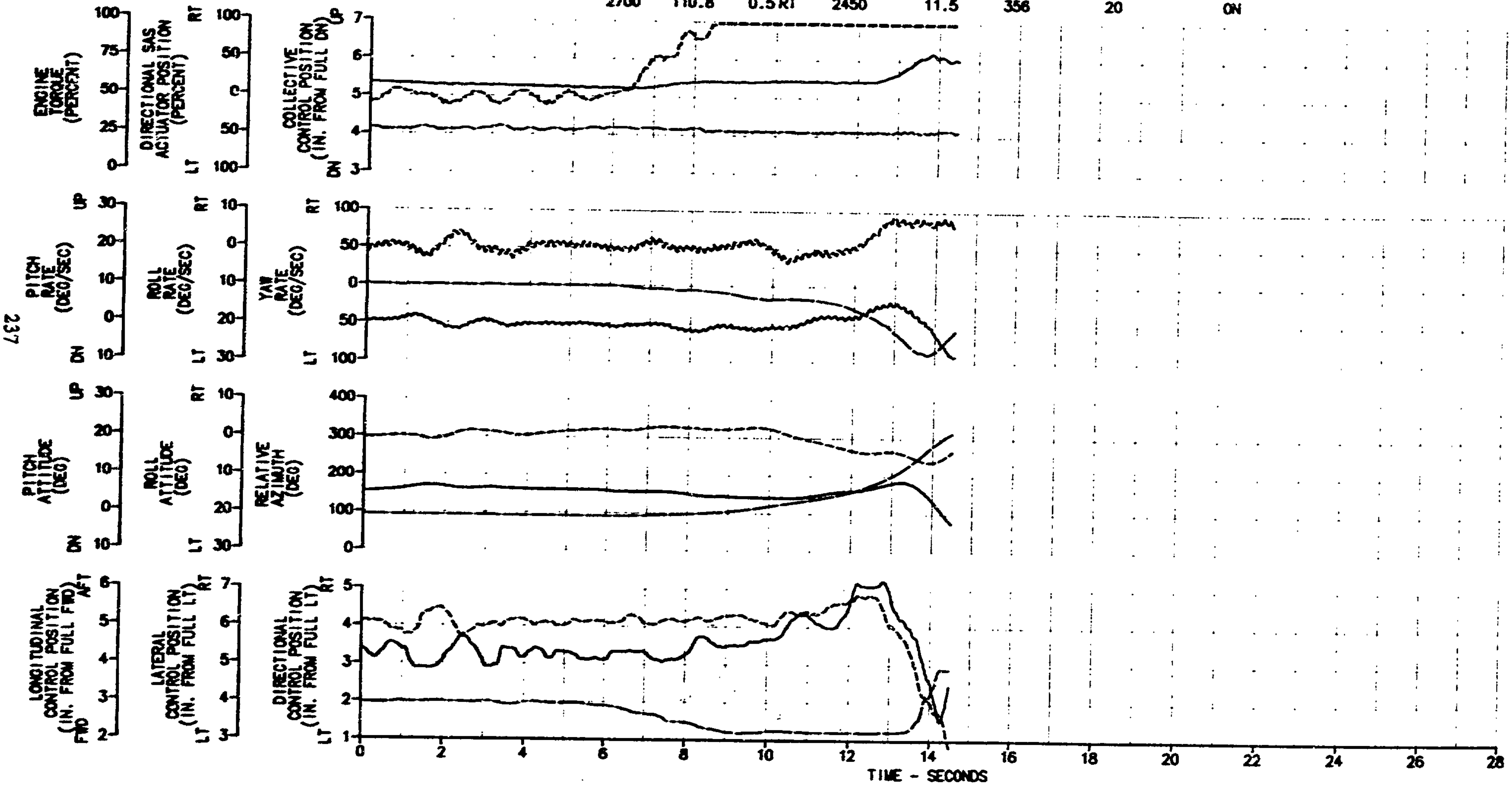


FIGURE E-202
LOW SPEED FLIGHT - LEFT YAW RATE
JOH-58C USA S/N 70-15349

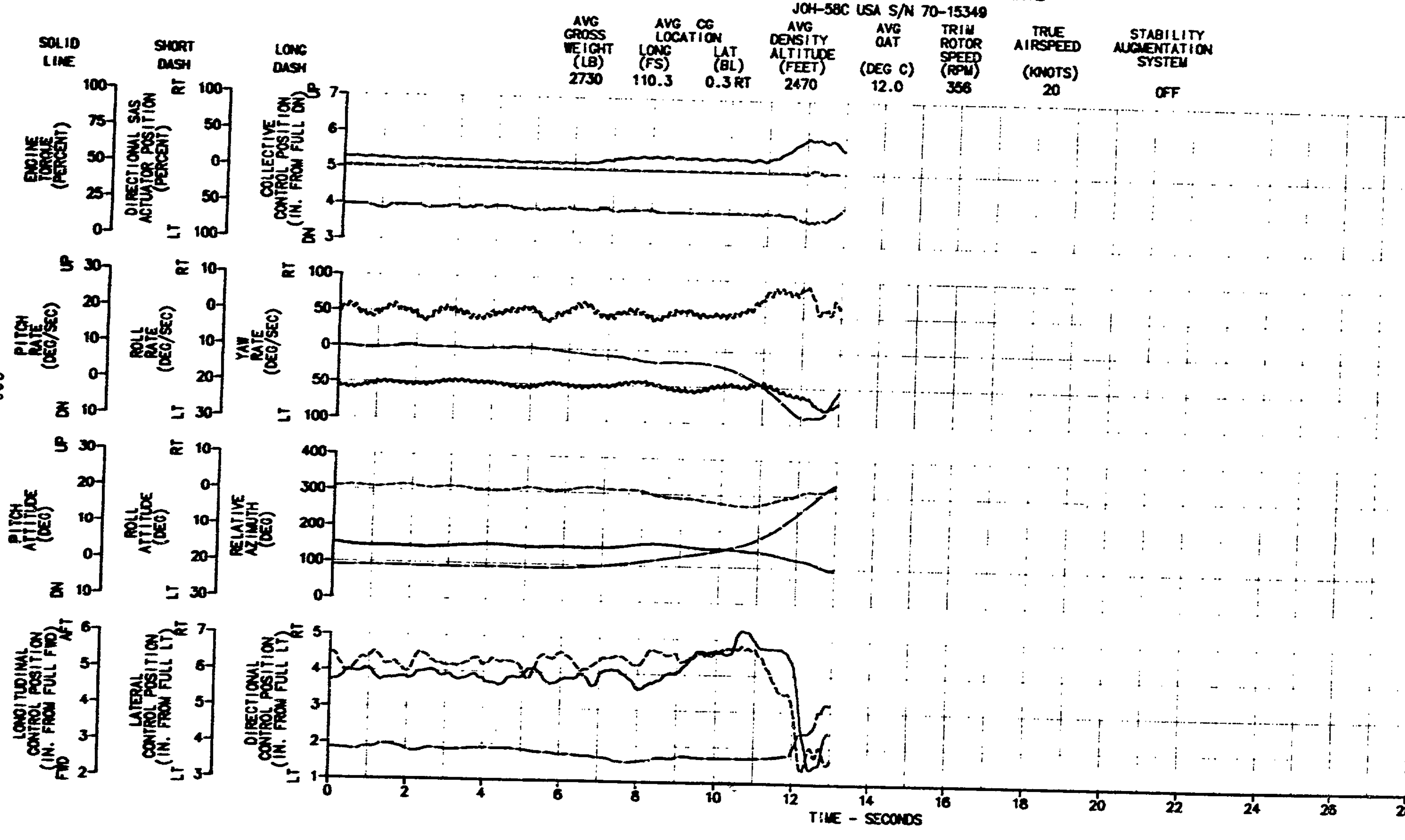


FIGURE E-203
LOW SPEED FLIGHT-RIGHT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2650	110.2	0.3 RT	5140	35.0	357	20	ON

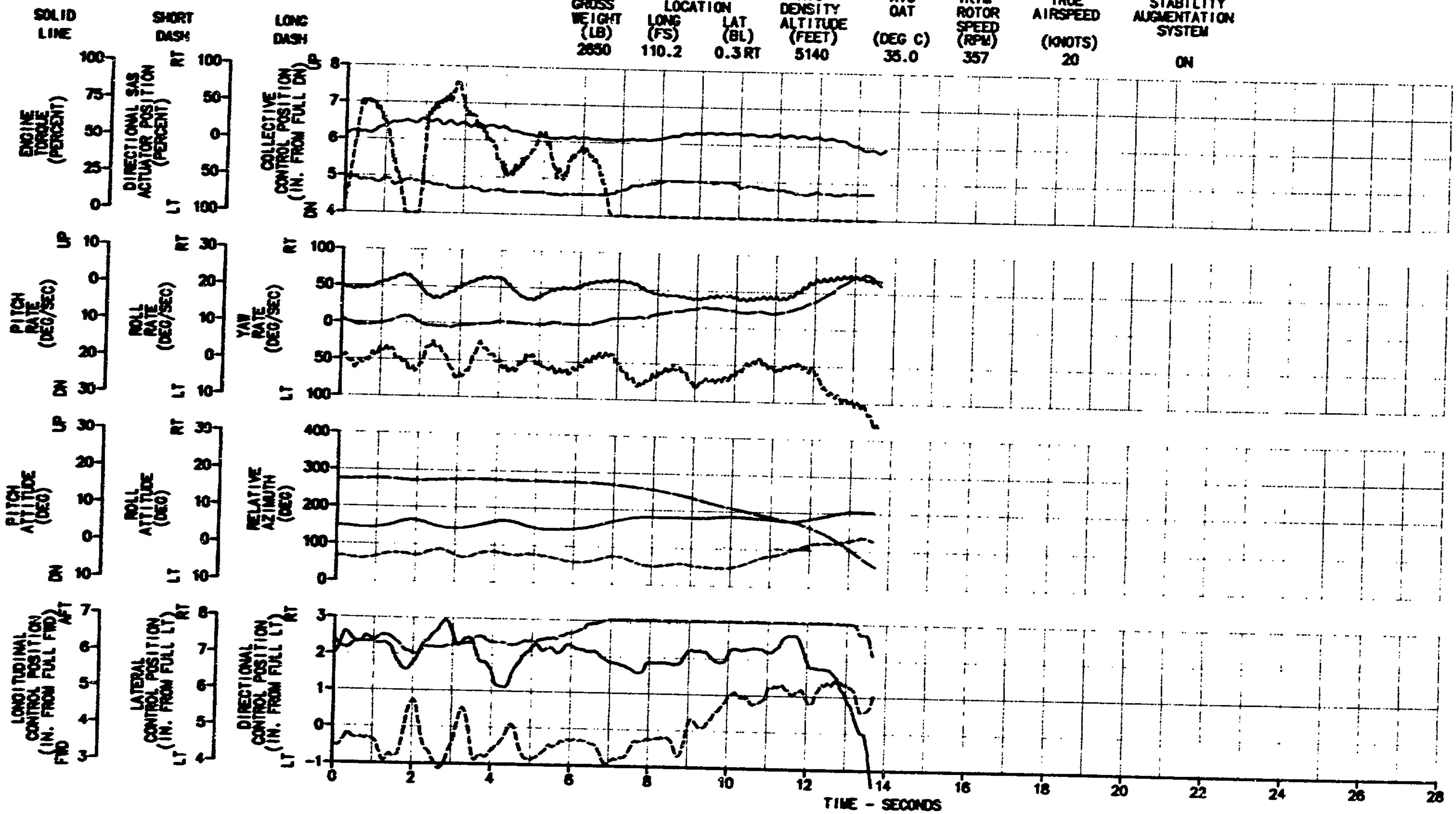


FIGURE E-204
LOW SPEED FLIGHT-RIGHT YAW RATE
JOH-58C USA S/N 70-15349

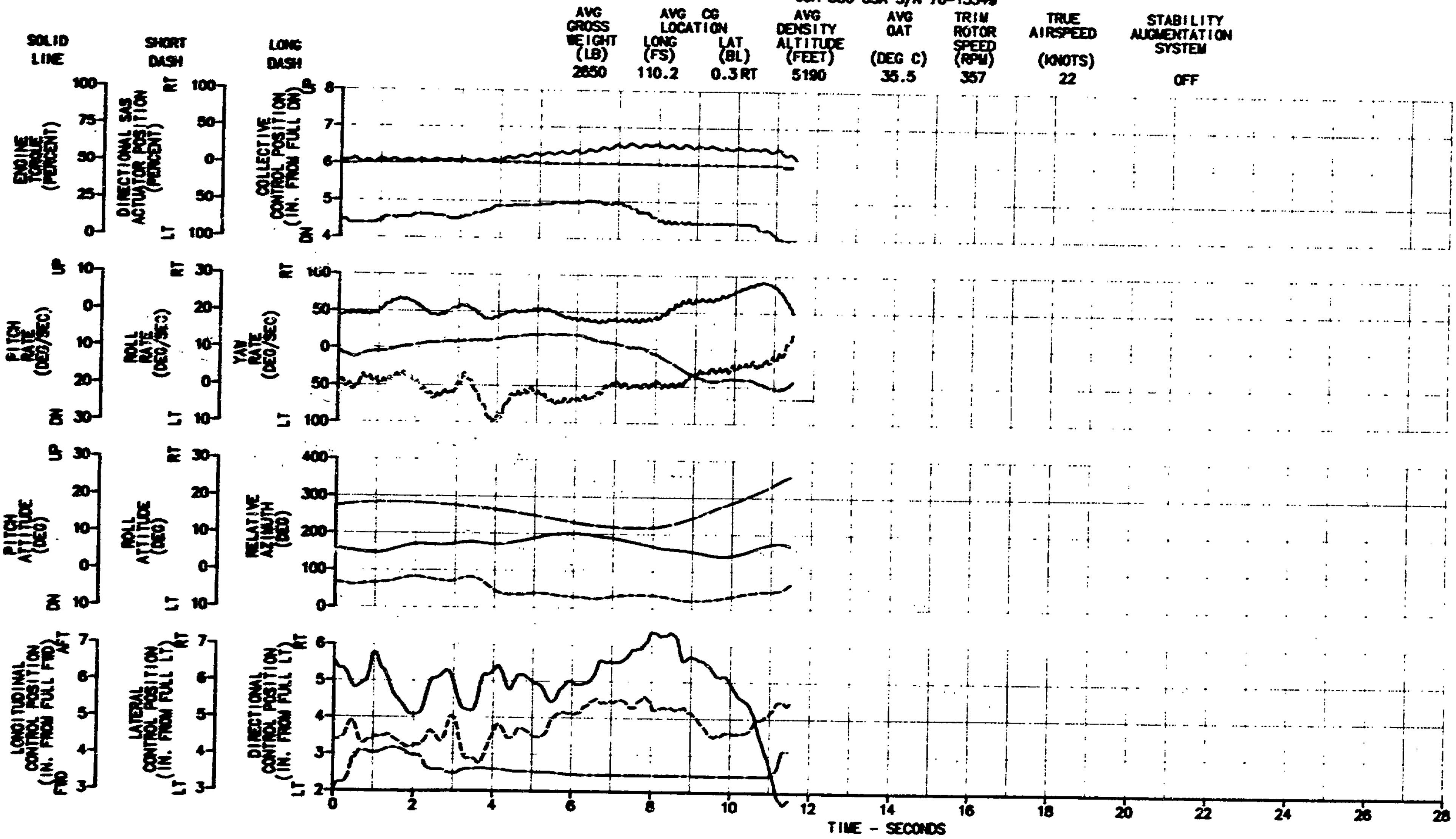


FIGURE E-205
LOW SPEED FLIGHT - LEFT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2710	110.3	0.3 RT	2450	11.5	357	24	ON

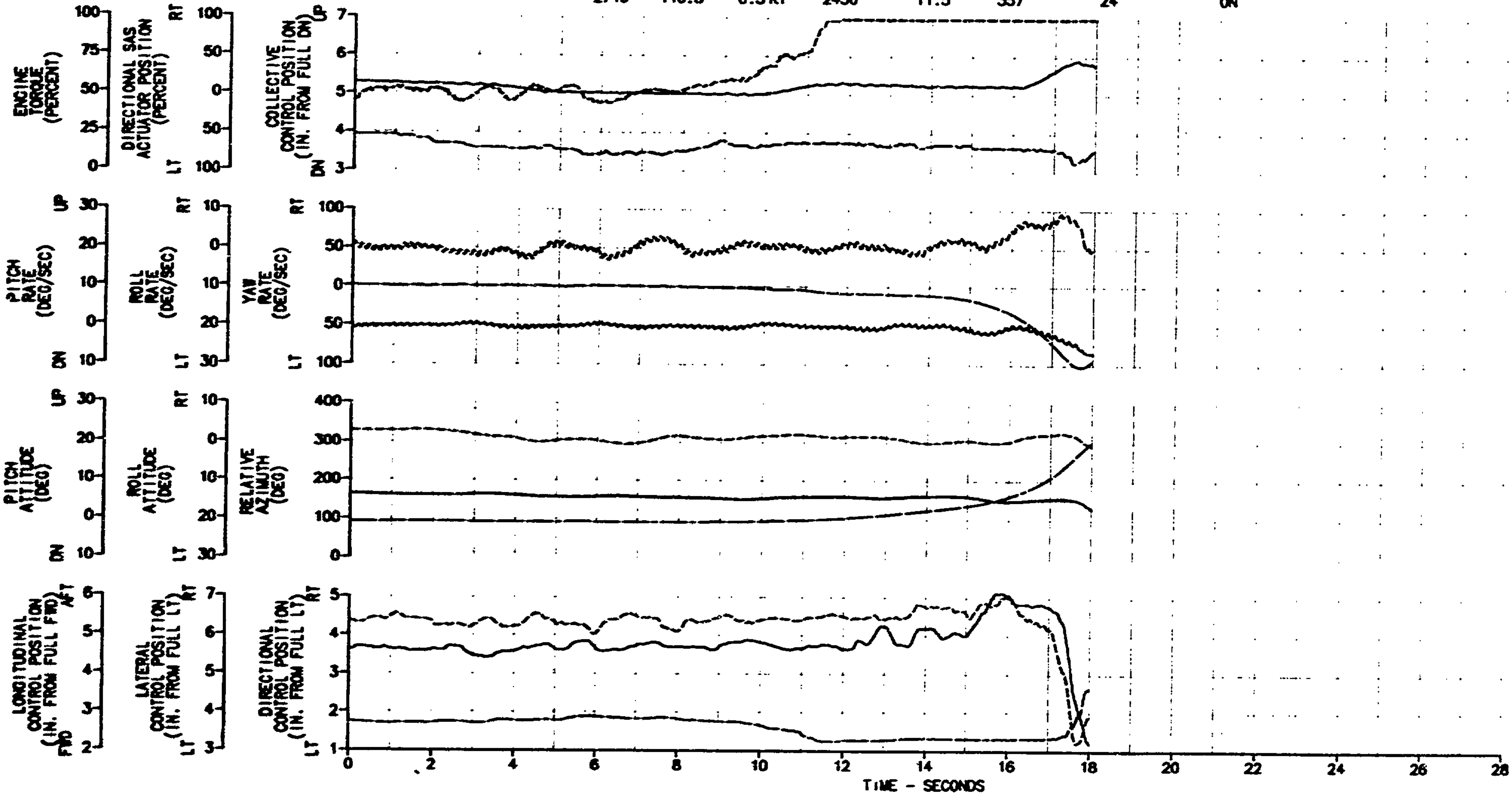


FIGURE E-206
LOW SPEED FLIGHT - LEFT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2700	110.2	0.3 RT	2530	12.5	355	24	OFF

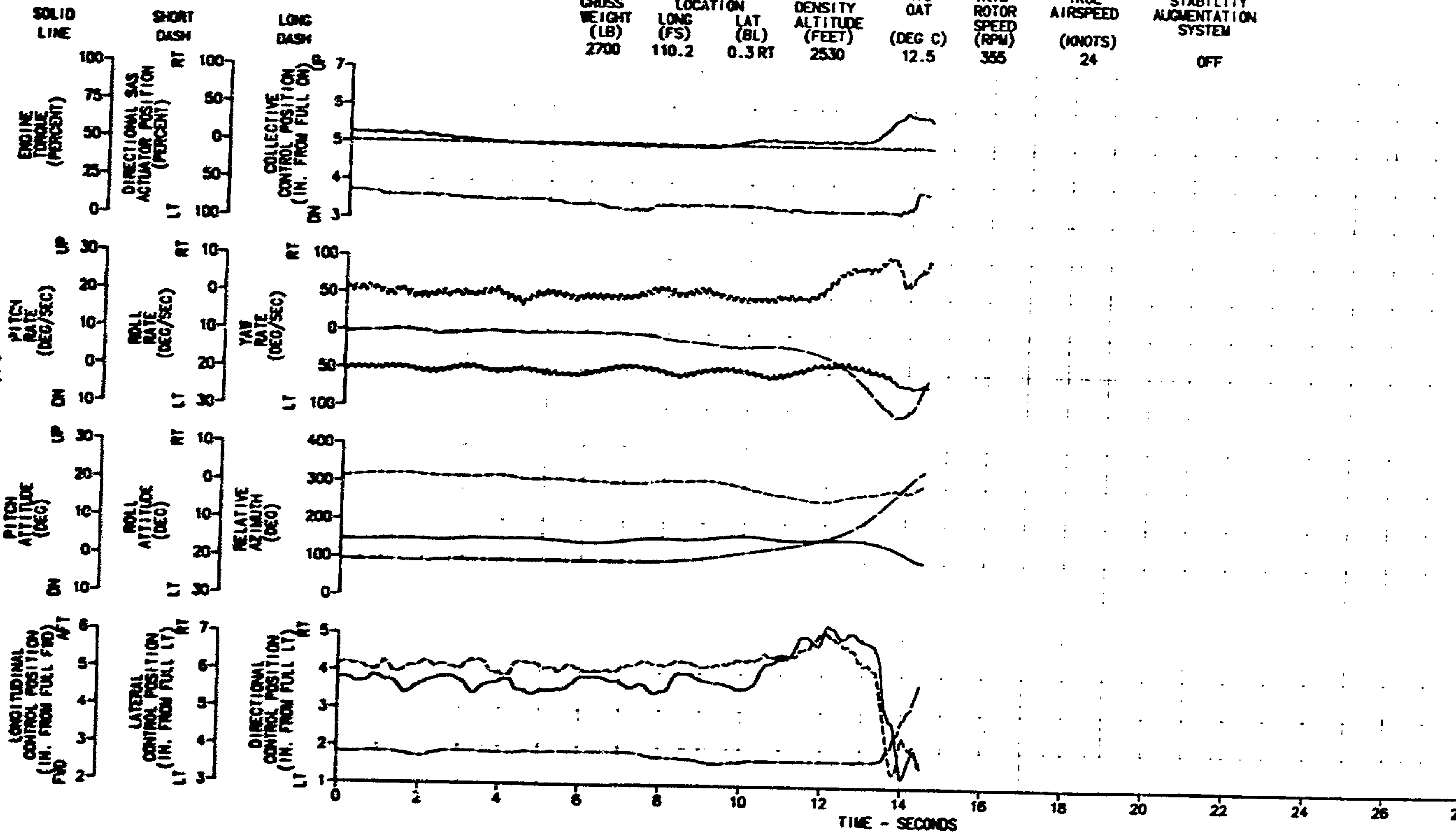


FIGURE E-207
LOW SPEED FLIGHT-RIGHT YAW RATE
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	TRUE AIRSPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2630	110.2	0.3 RT	5190	35.0	359	24	OFF

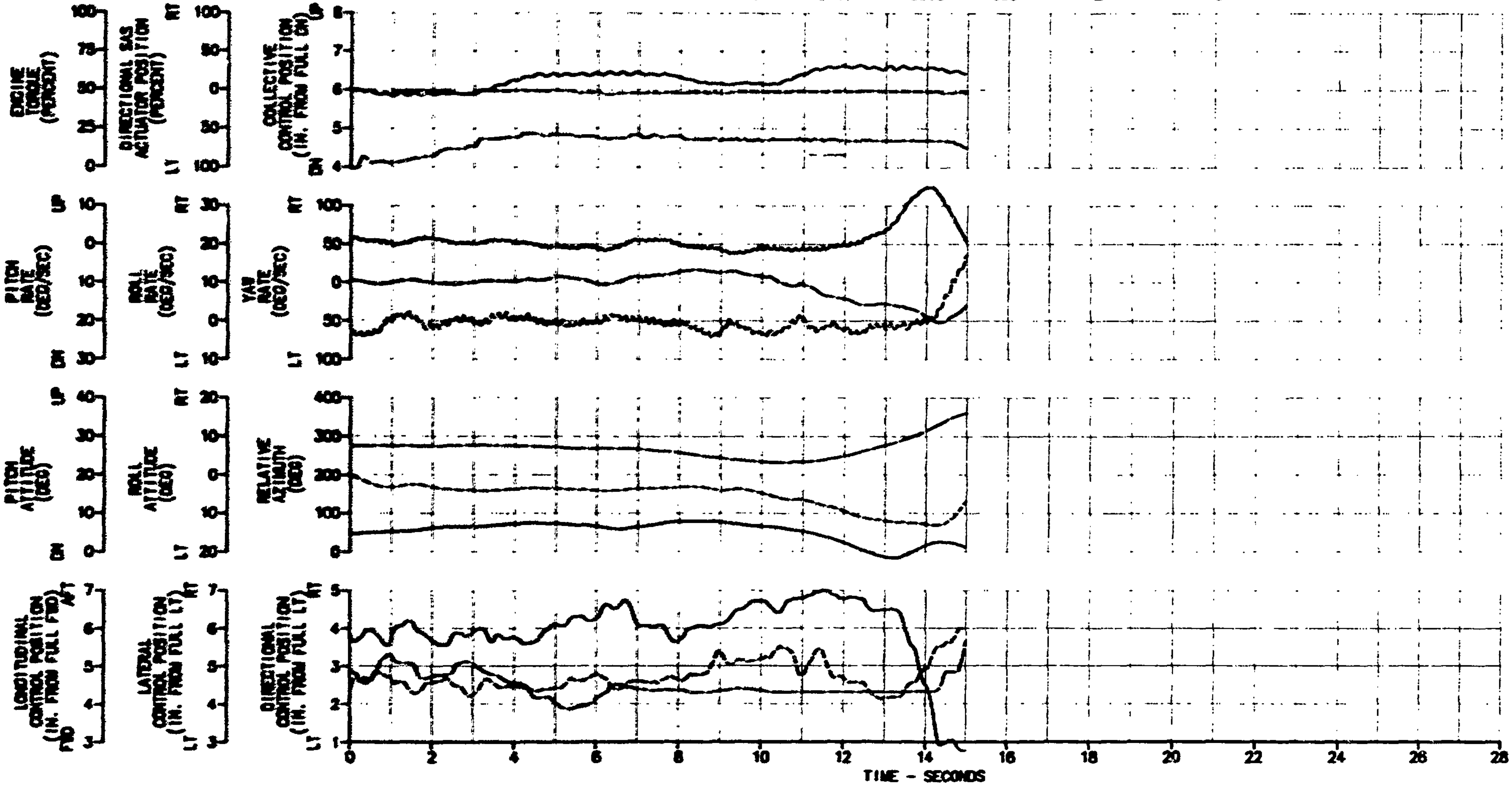


FIGURE E-208
LOW SPEED FLIGHT - LEFT YAW RATE
JOH-58C USA S/N 70-15349

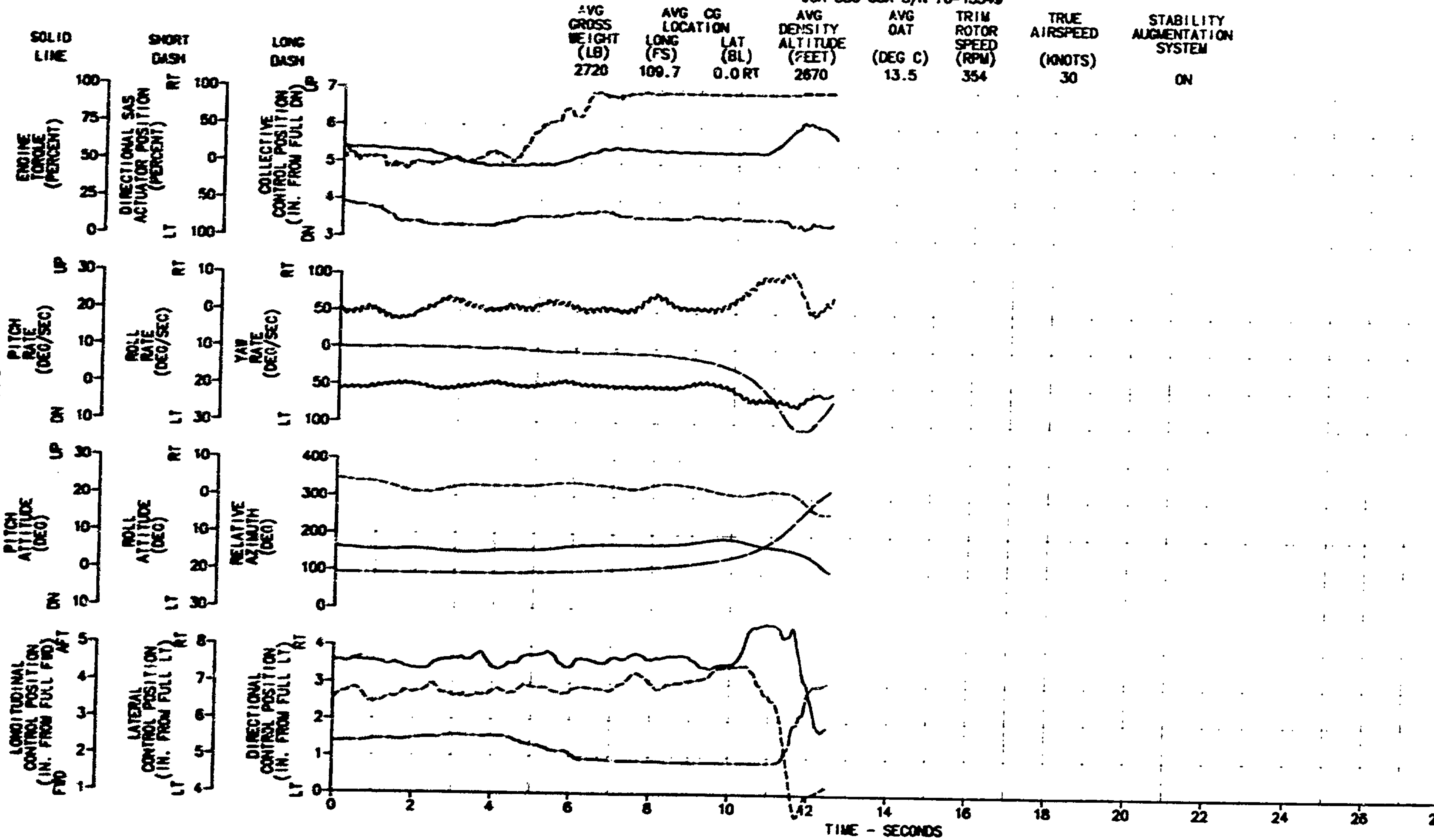


FIGURE E-209
DIRECTIONAL TRIM CHANGES WITH POWER
JOH-58C S/N 70-15349

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KT)	AVG SIDESLIP (DEG)
○	3030	108.0	0.2 LT	7370	19.5	357	30	30 LT
△	3050	108.1	0.2 LT	8090	18.5	357	31	21 LT
◇	3060	108.2	0.2 LT	8080	18.5	358	31	10 LT
⊠	3090	108.3	0.2 LT	7620	19.0	355	30	0
⌑	3090	108.8	0.2 LT	7670	21.5	358	33	9 RT
☆	3080	108.8	0.2 LT	7290	22.0	357	32	20 RT
♧	3080	108.7	0.2 LT	7150	22.5	356	33	30 RT

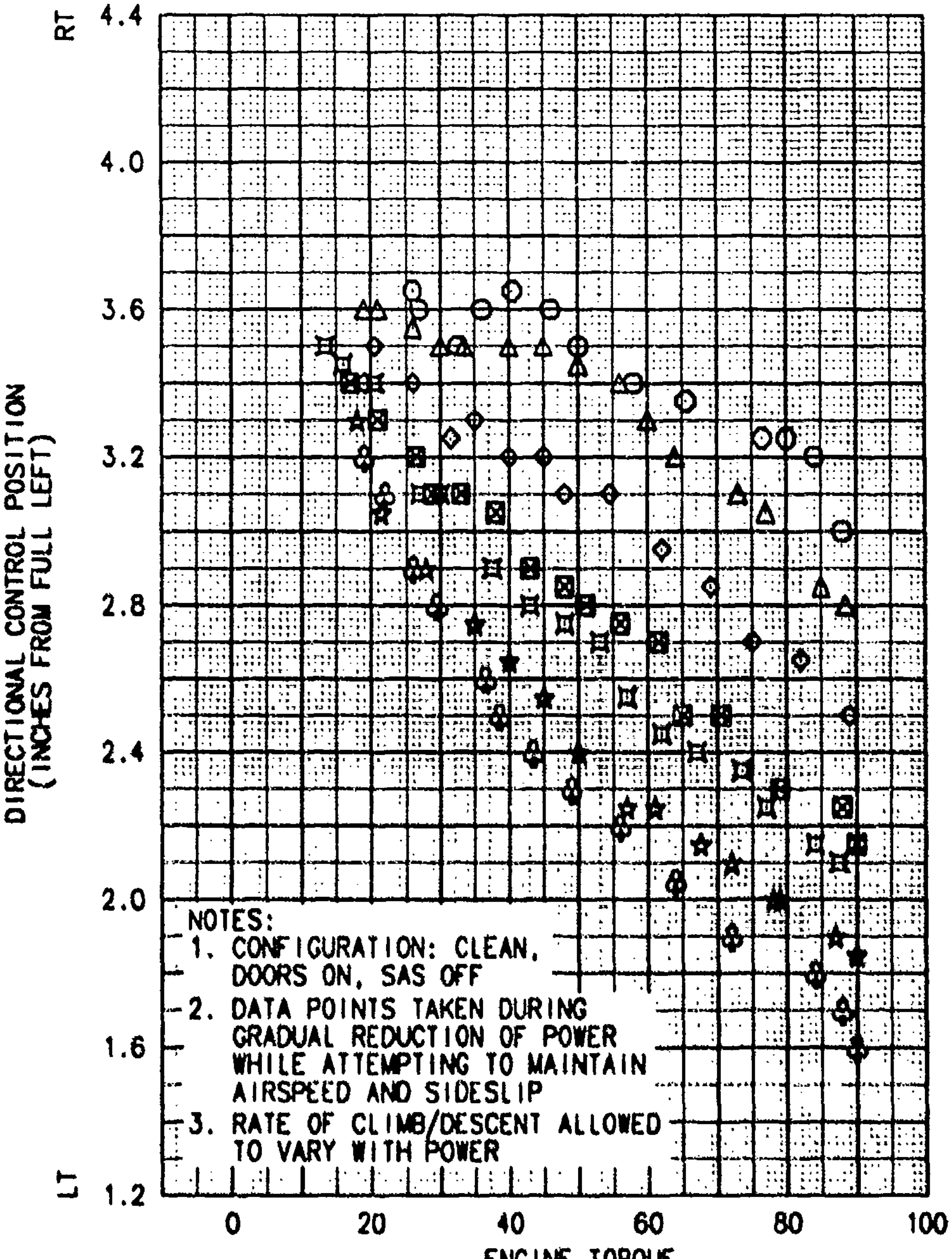


FIGURE E-210
DIRECTIONAL TRIM CHANGES WITH POWER
JOH-58C S/N 70-15349

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KT)	AVG SIDESLIP (DEG)
○	3040	107.9	0.2 LT	7870	18.5	358	39	31 LT
△	3040	107.9	0.2 LT	8460	18.0	358	40	21 LT
◇	3050	108.0	0.2 LT	8450	18.0	358	40	11 LT
⊠	3010	108.1	0.2 LT	8130	19.0	358	41	0
⌑	3070	108.1	0.2 LT	8280	18.5	358	40	10 RT
☆	3070	108.1	0.2 LT	8070	19.0	357	39	21 RT
♧	3060	108.0	0.2 LT	8420	18.5	357	40	30 RT

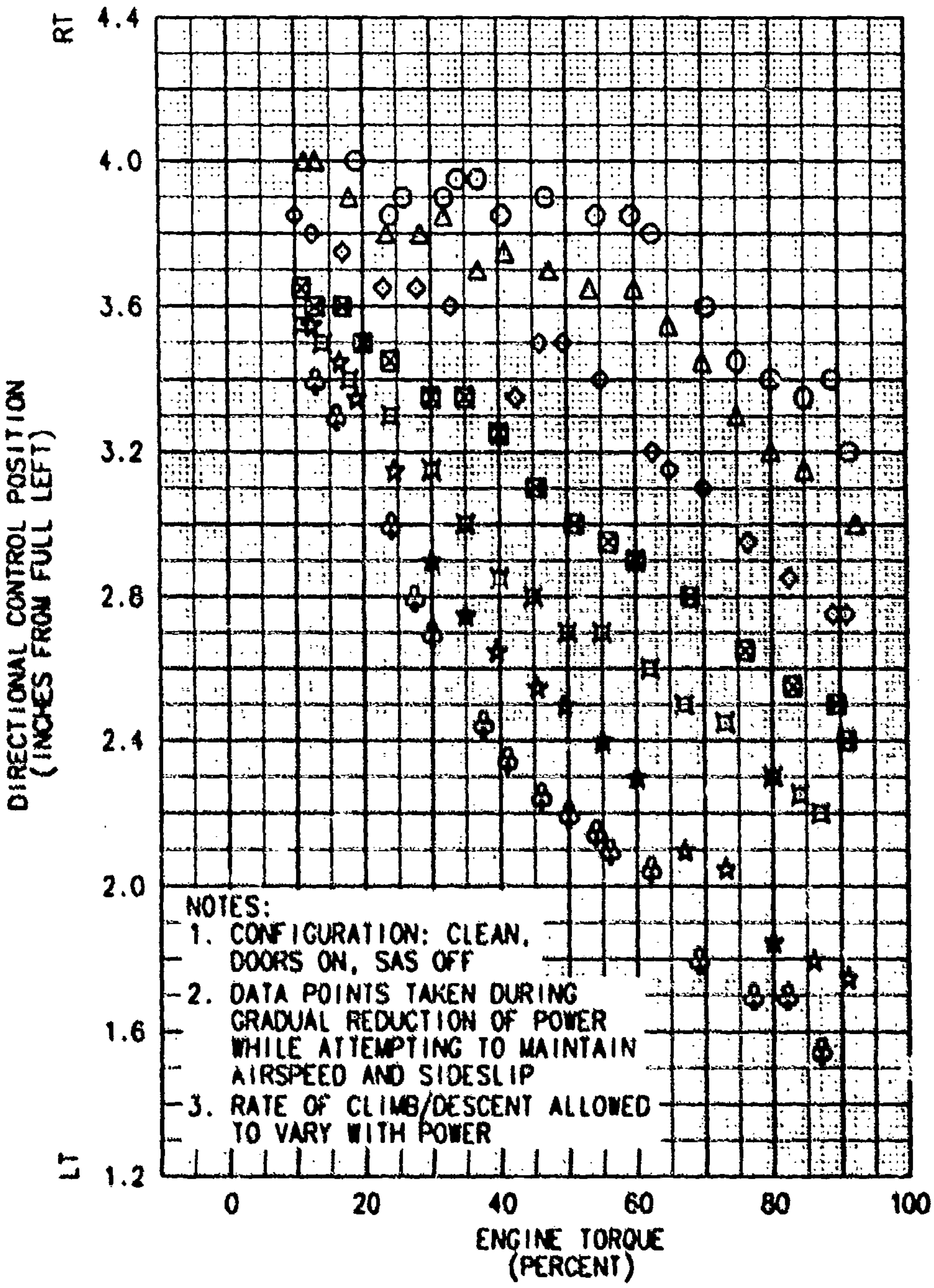
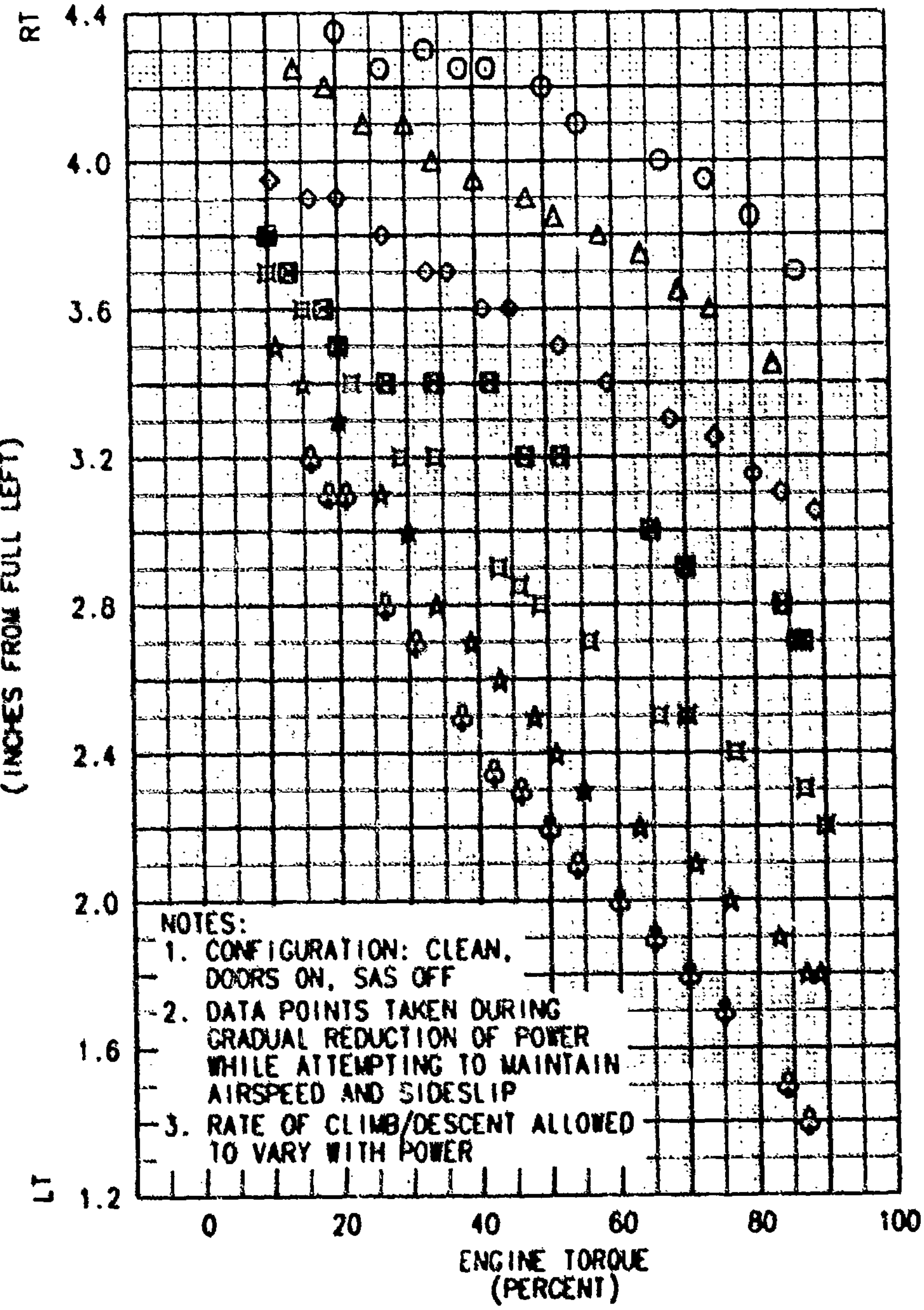


FIGURE E-211
DIRECTIONAL TRIM CHANGES WITH POWER
JOH-58C S/N 70-15349

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	AVG CALIBRATED AIRSPEED (KT)	AVG SIDESLIP (DEG)
○	3090	108.1	0.2 LT	7690	19.0	358	51	32 LT
△	3100	108.2	0.2 LT	8250	18.0	358	52	21 LT
◇	3110	108.2	0.2 LT	7100	18.5	358	51	11 LT
⊠	3130	108.3	0.2 LT	7920	19.0	359	51	2 LT
⌑	3120	108.3	0.2 LT	8520	18.0	358	52	10 RT
☆	3120	108.3	0.2 LT	7930	18.5	358	52	21 RT
♧	3110	108.2	0.2 LT	7710	19.0	357	51	30 RT



NOTES:
1. CONFIGURATION: CLEAN, DOORS ON, SAS OFF
2. DATA POINTS TAKEN DURING GRADUAL REDUCTION OF POWER WHILE ATTEMPTING TO MAINTAIN AIRSPEED AND SIDESLIP
3. RATE OF CLIMB/DESCENT ALLOWED TO VARY WITH POWER

FIGURE E-212
DIRECTIONAL TRIM CHANGE WITH POWER
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	STABILITY AUGMENTATION SYSTEM
3130	102.9	0.1 LT	7910	19.0	354	OFF

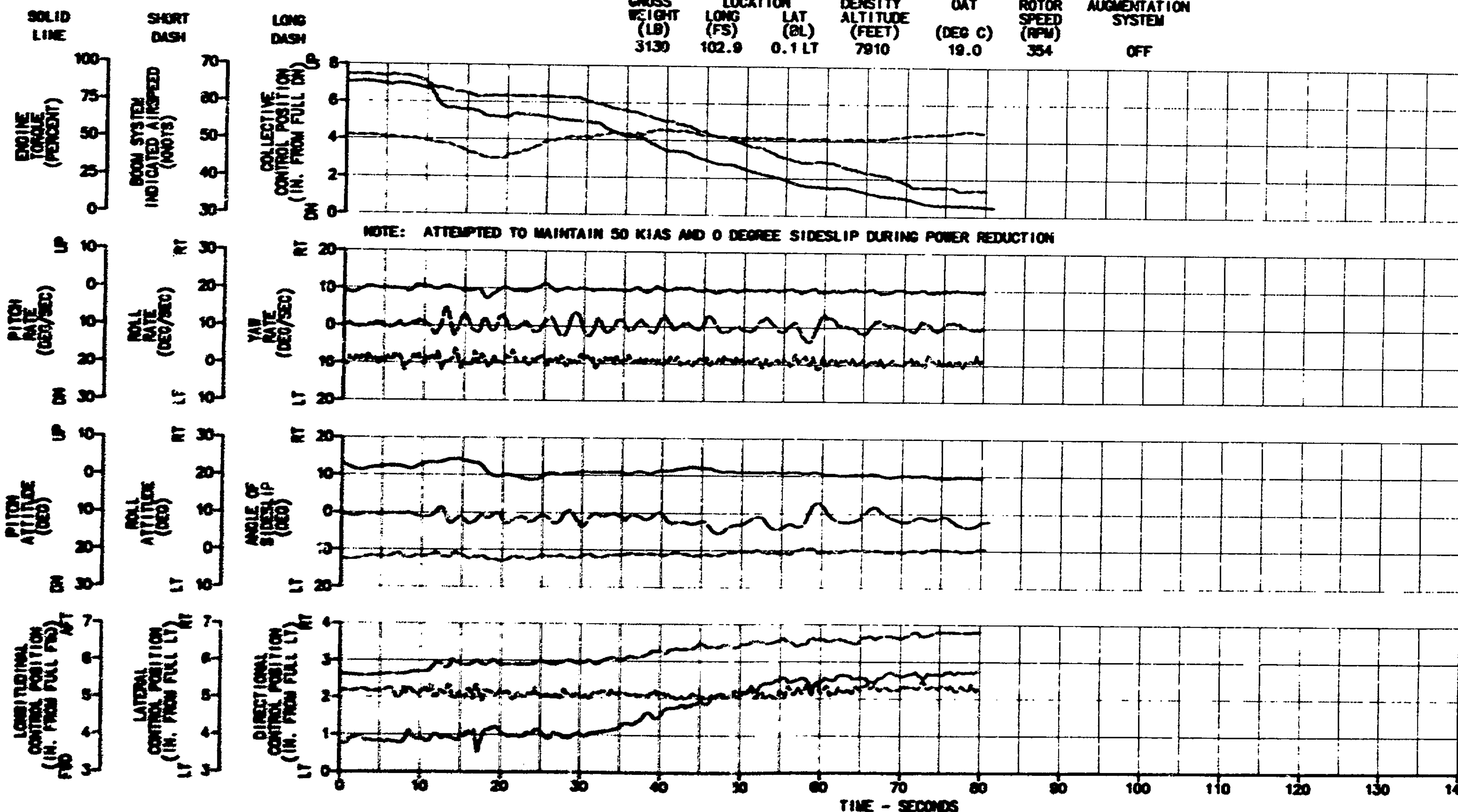


FIGURE E-213
DIRECTIONAL TRIM CHANGE WITH POWER
JOH-58C USA S/N 70-15349

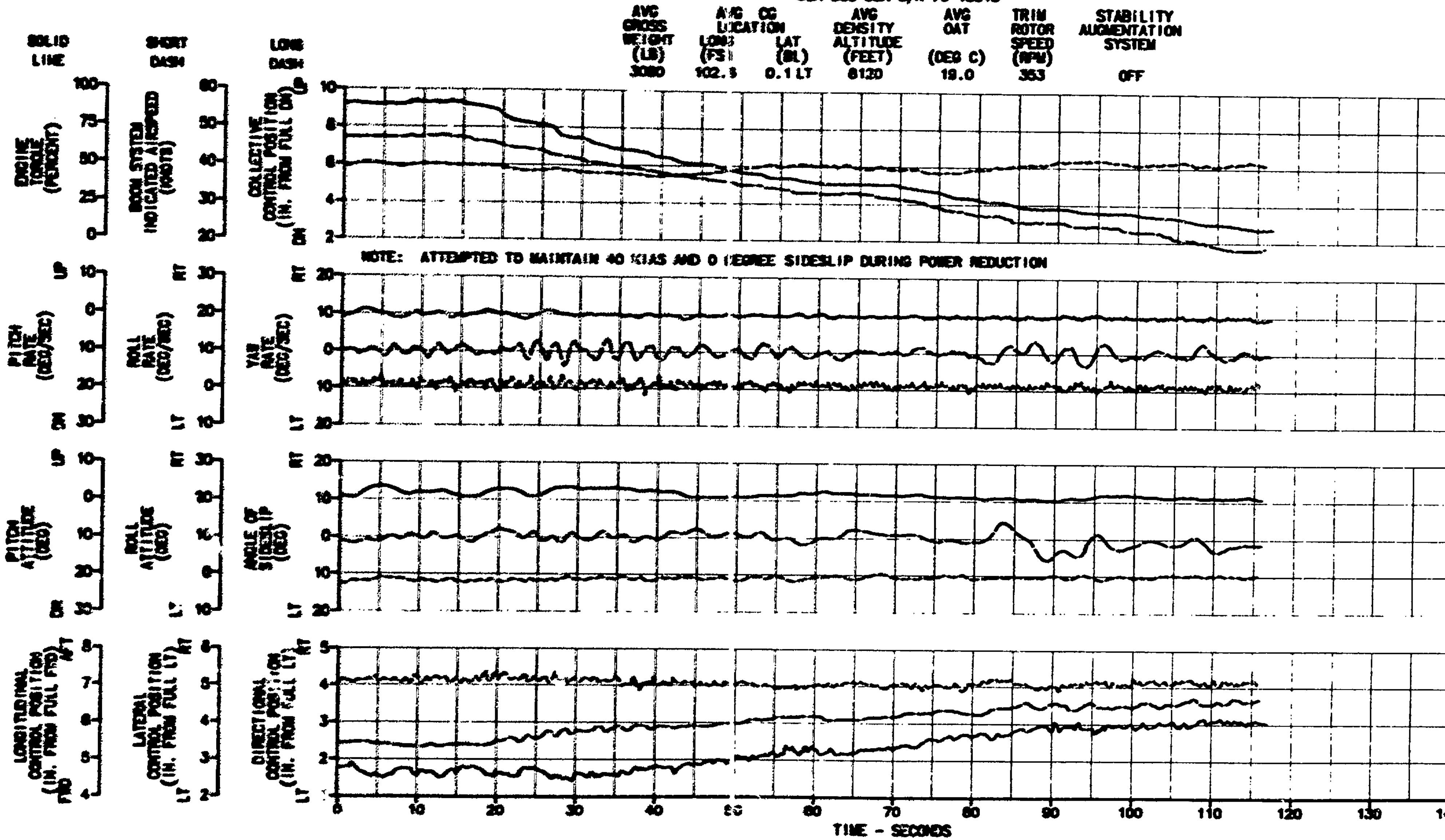


FIGURE E-214
DIRECTIONAL TRIM CHANGE WITH POWER
JOH-58C USA S/N 70-15349

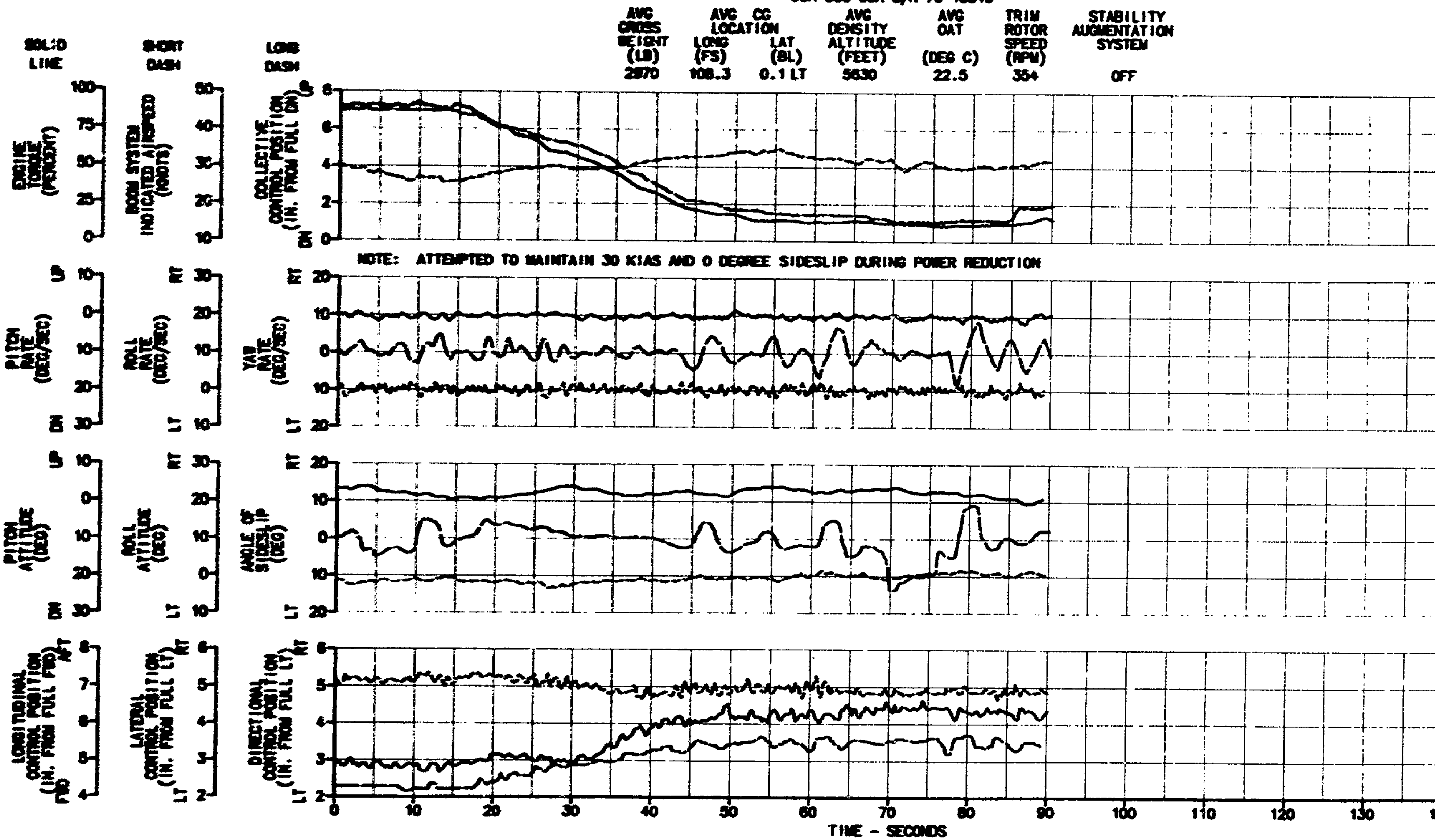


FIGURE E-215
DIRECTIONAL TRIM CHANGE WITH POWER
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	STABILITY AUGMENTATION SYSTEM
3040	108.6	0.2 LT	6670	23.0	352	OFF

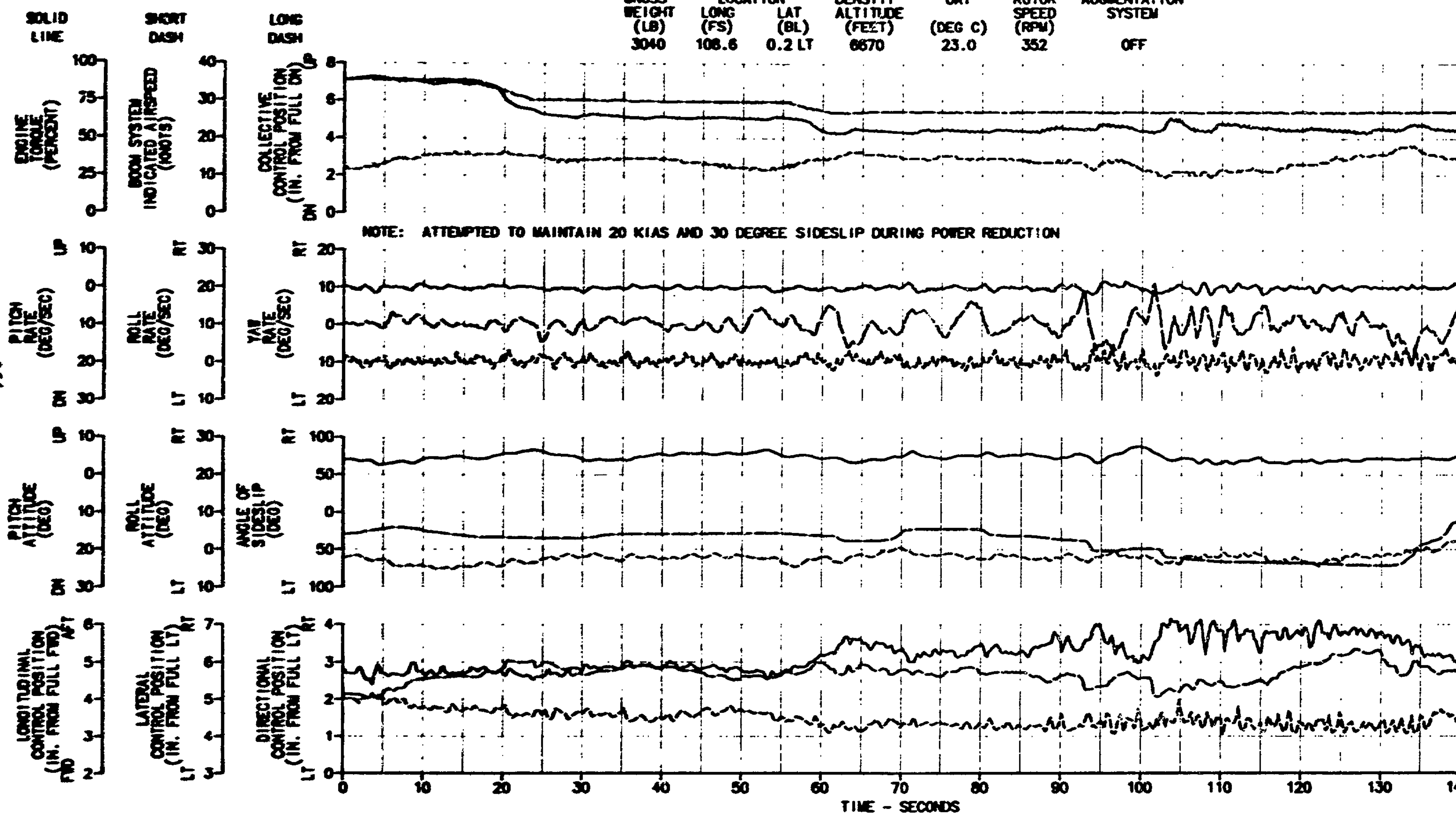


FIGURE E-216
DIRECTIONAL TRIM CHANGE WITH POWER
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	STABILITY AUGMENTATION SYSTEM
3020	108.5	0.2 LT	7010	23.0	354	OFF

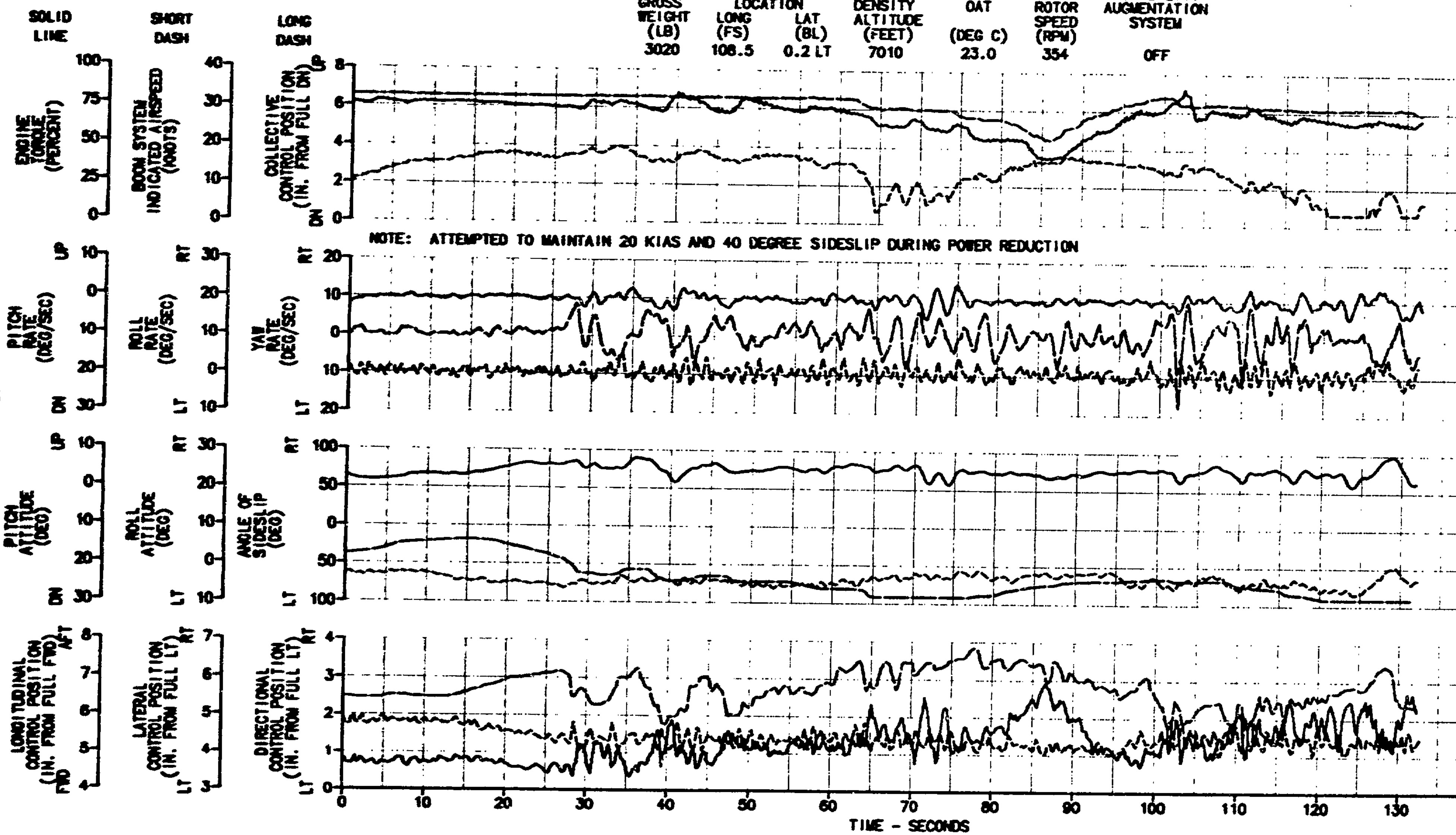


FIGURE E-217
SIMULATED ENGINE FAILURE
JOH-58C USA S/N 70-15349

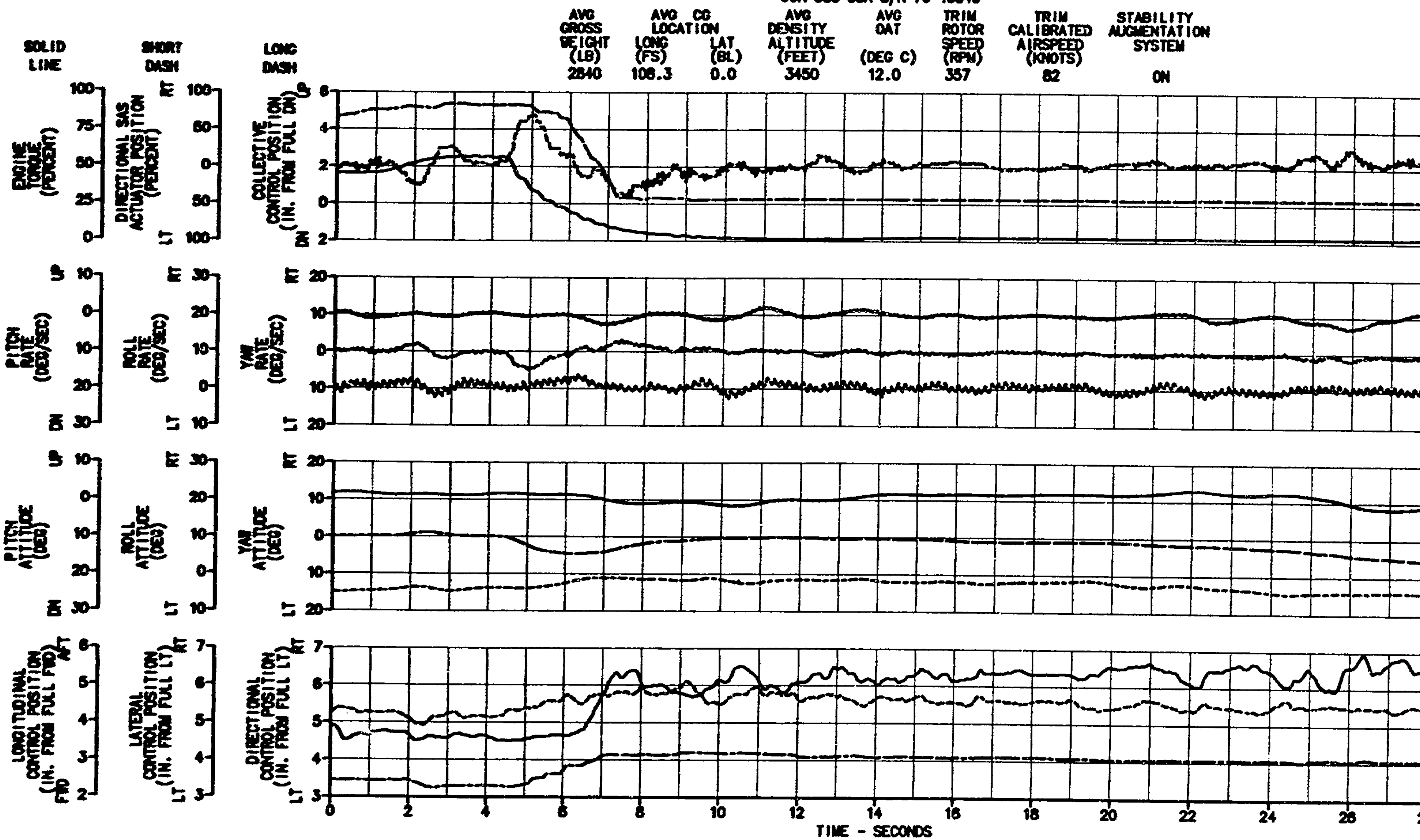


FIGURE E-218
IGE HOVER IN WINDS - 000 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.4	0.0	2900	14.5	353	23 - 36	ON

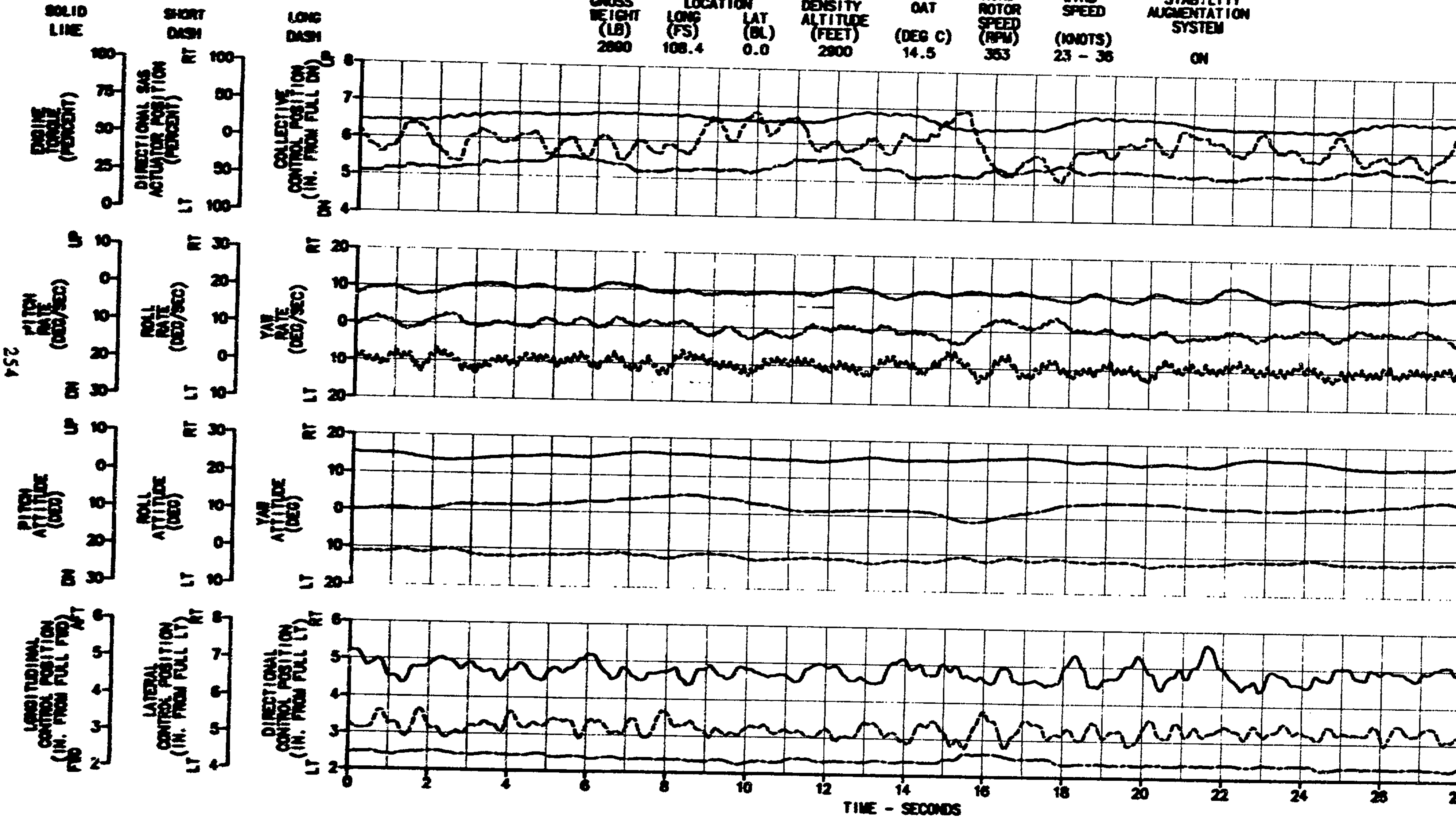


FIGURE E-219
IGE HOVER IN WINDS - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

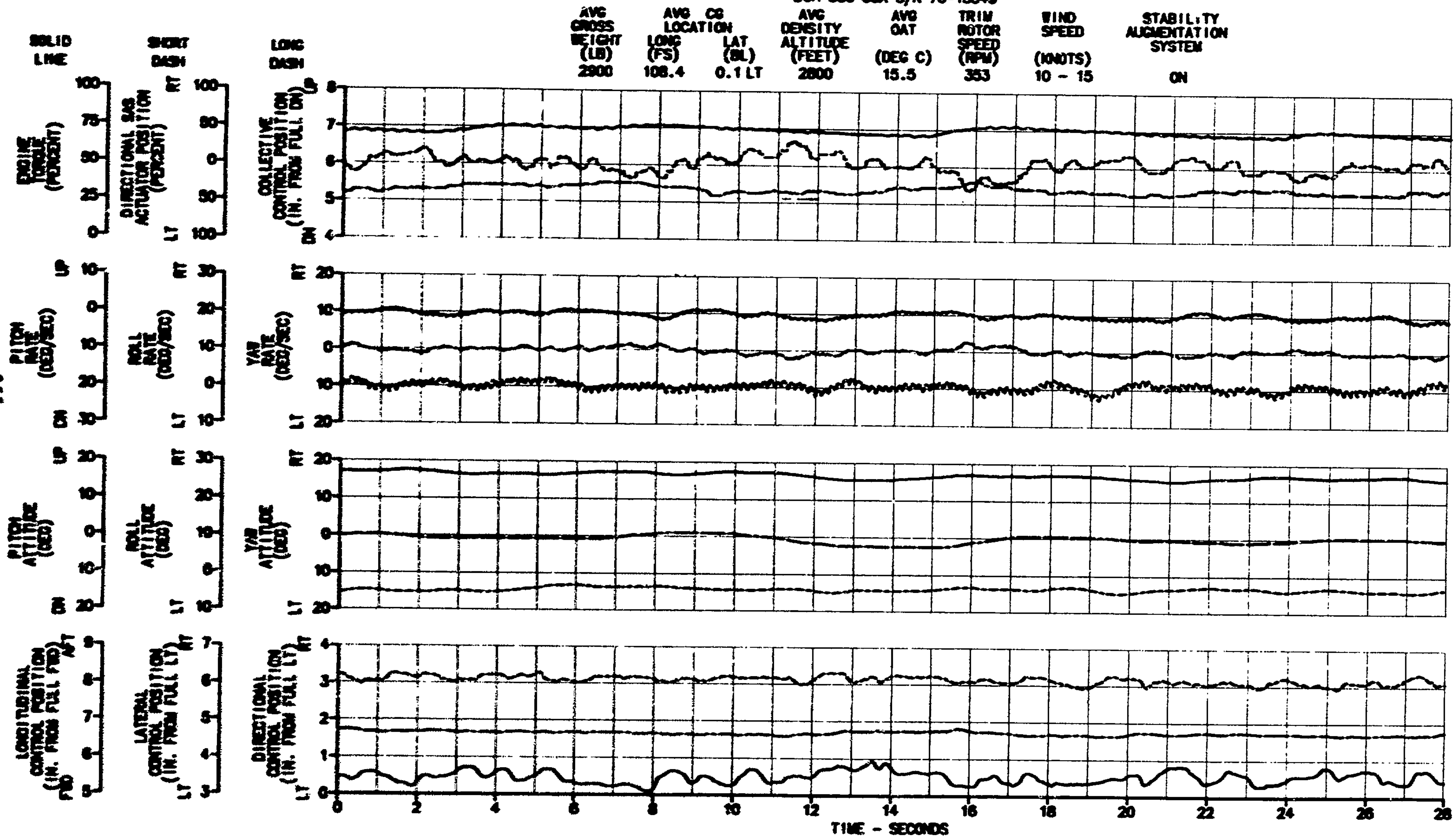


FIGURE E-220

IGE HOVER IN WINDS - 090 DEGREE AZIMUTH

JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2800	108.4	0.1 LT	3000	17.0	351	10 - 15	OFF

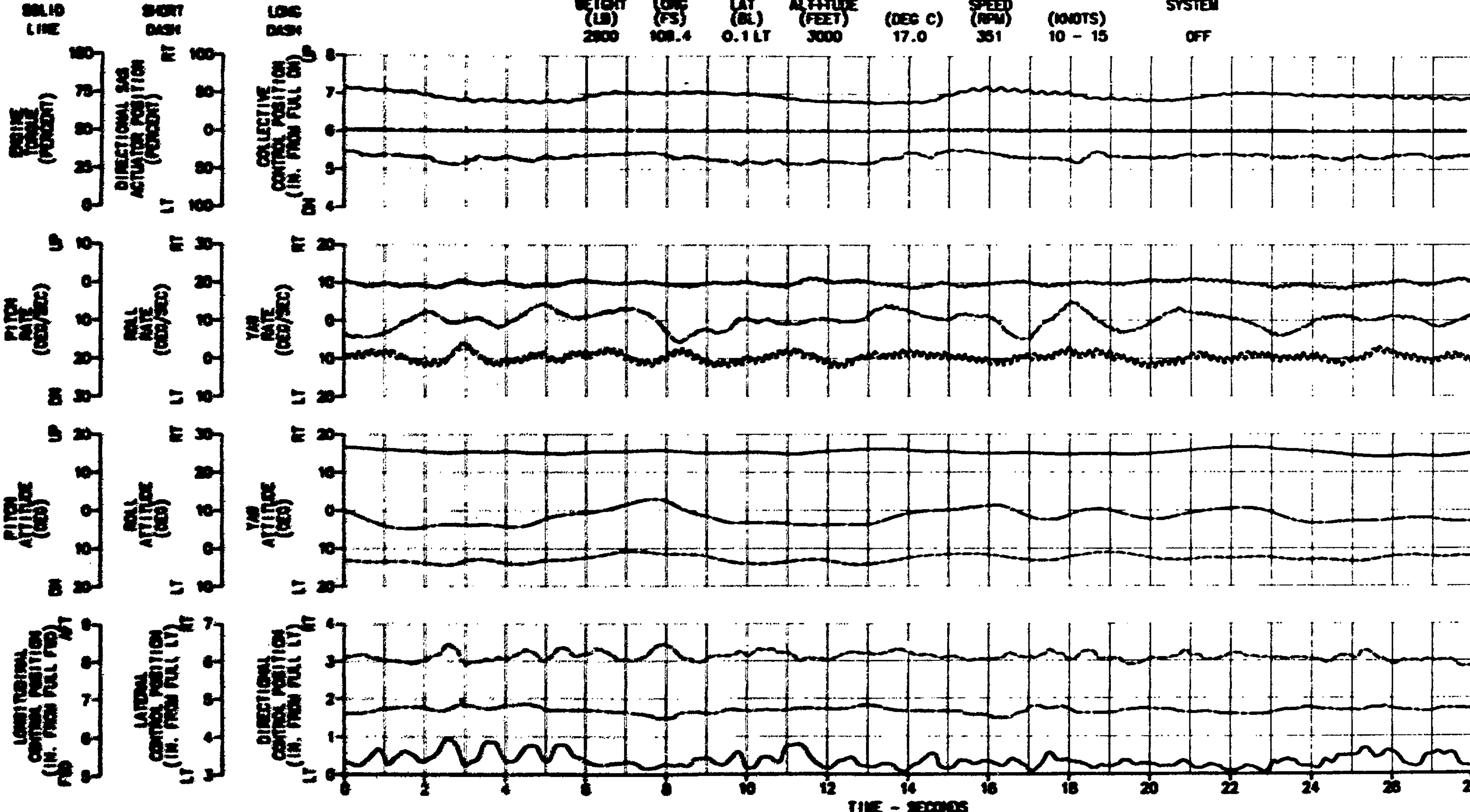


FIGURE E-221
IGE HOVER IN WINDS - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

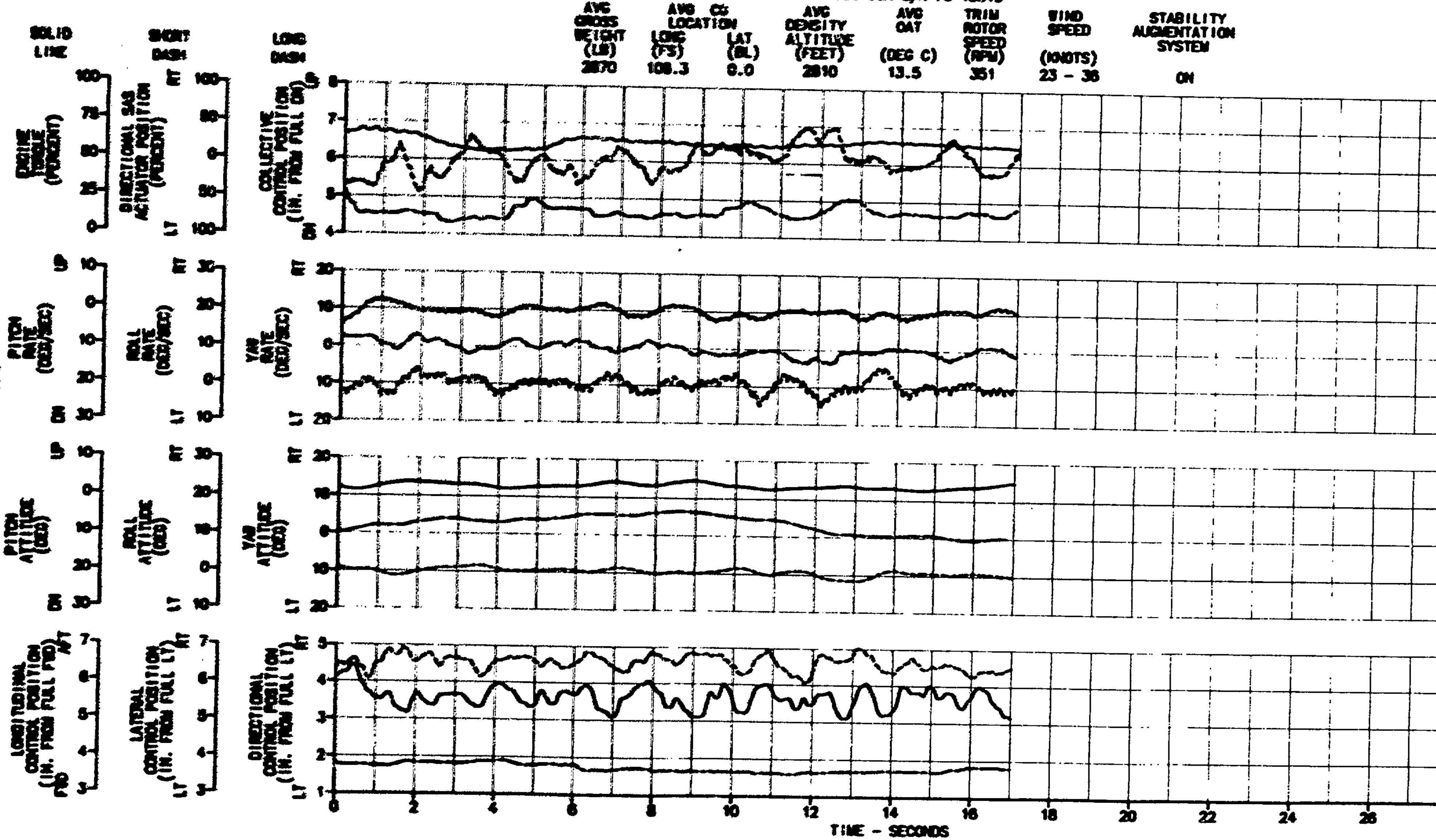


FIGURE E-222
IGE HOVER IN WINDS - 090 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

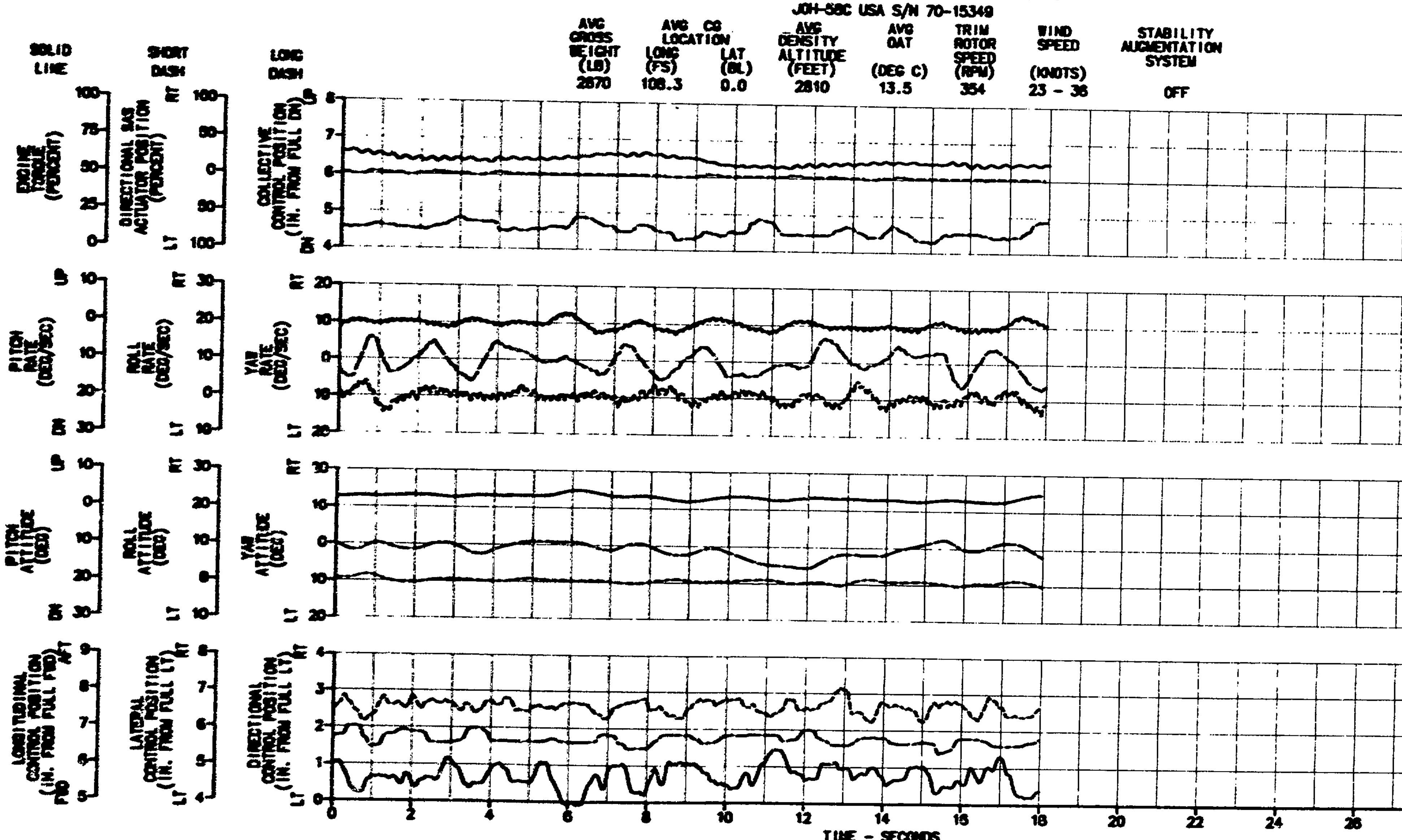


FIGURE E-223
IGE HOVER IN WINDS - 120 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2800	108.4	0.1 LT	3300	19.5	353	10 - 15	ON

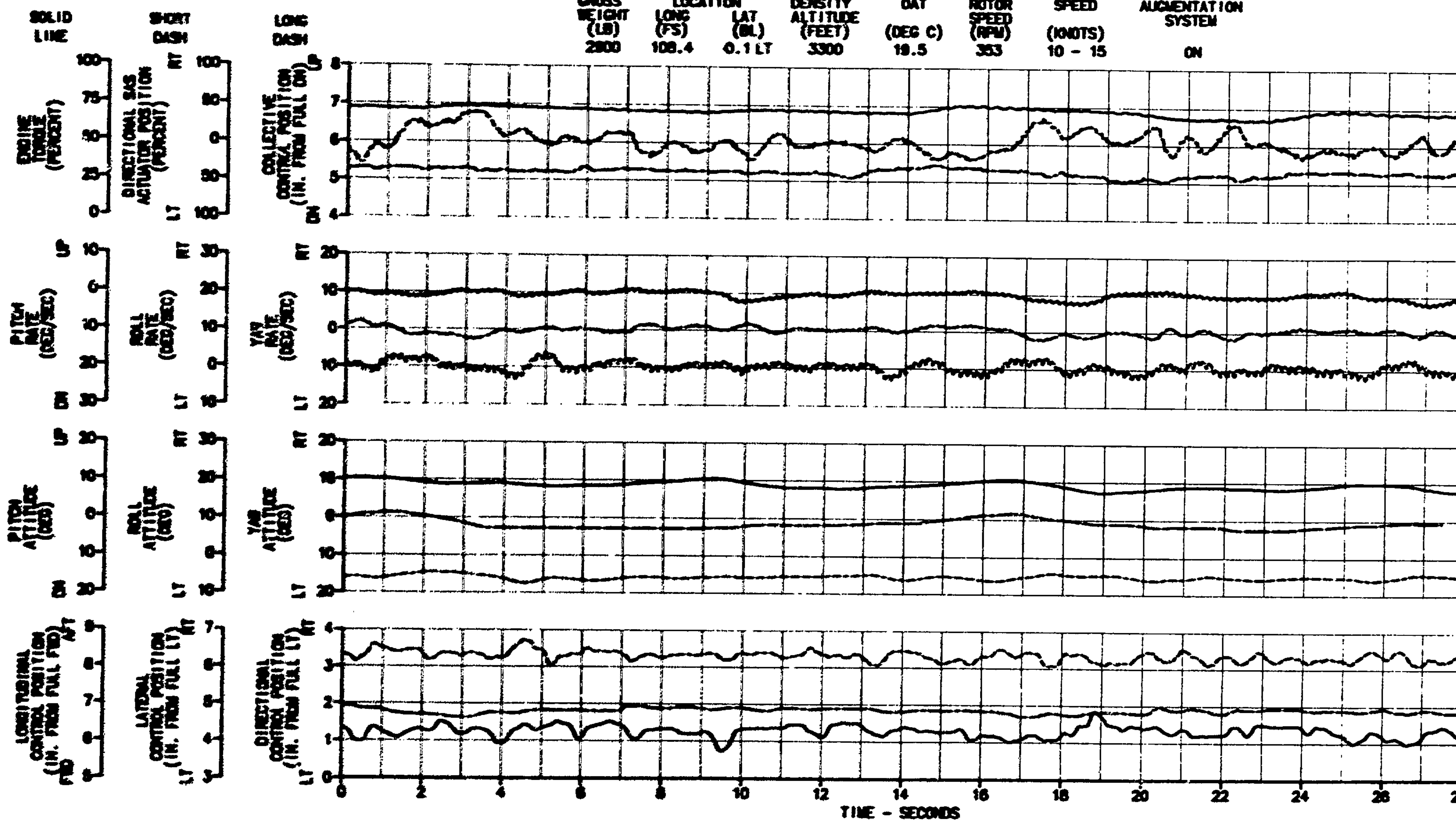


FIGURE E-224
IGE HOVER IN WINDS - 120 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.3	0.1 LT	3470	21.0	354	10 - 15	OFF

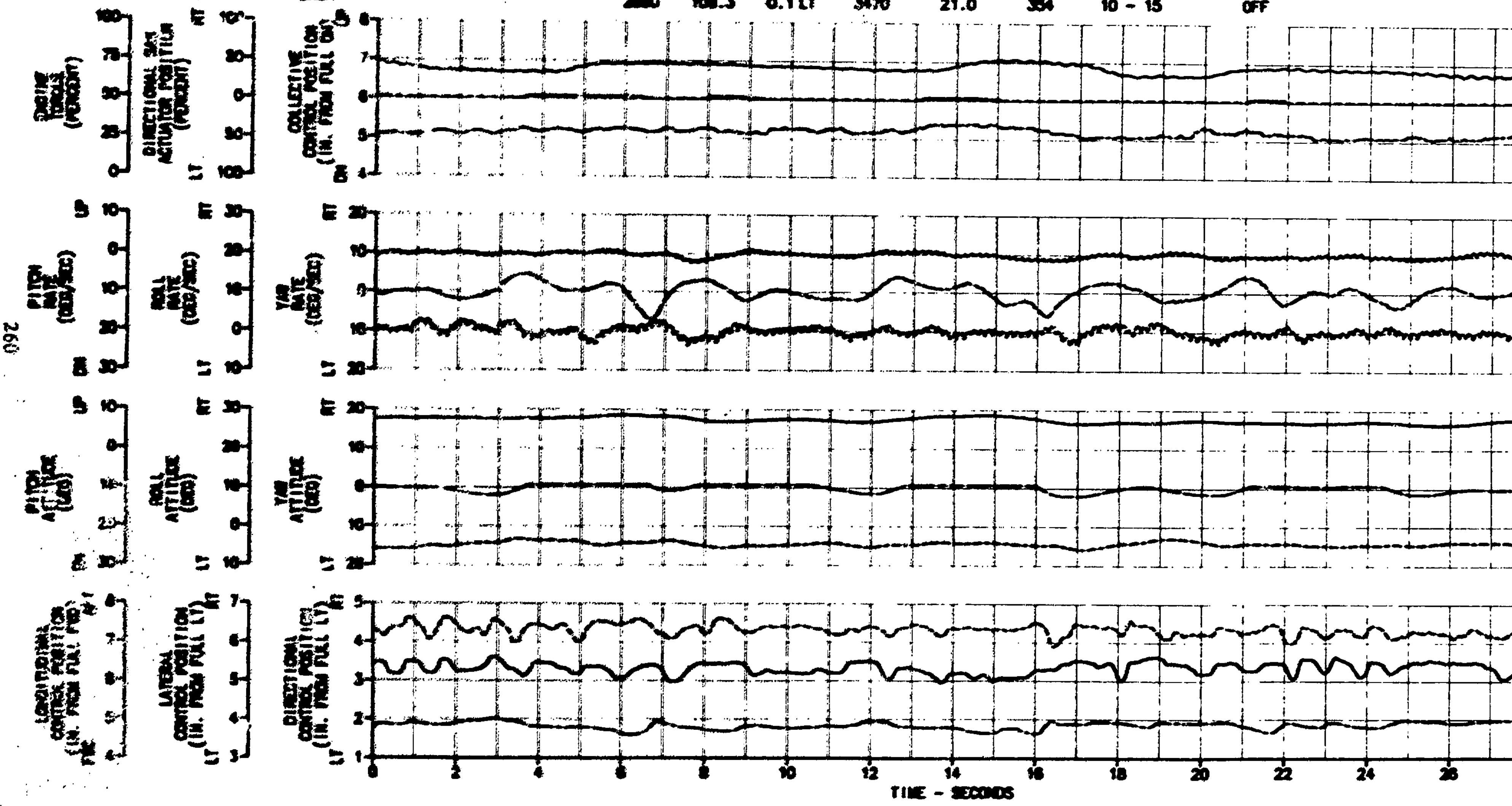


FIGURE E-225
ICE HOVER IN WINDS - 150 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

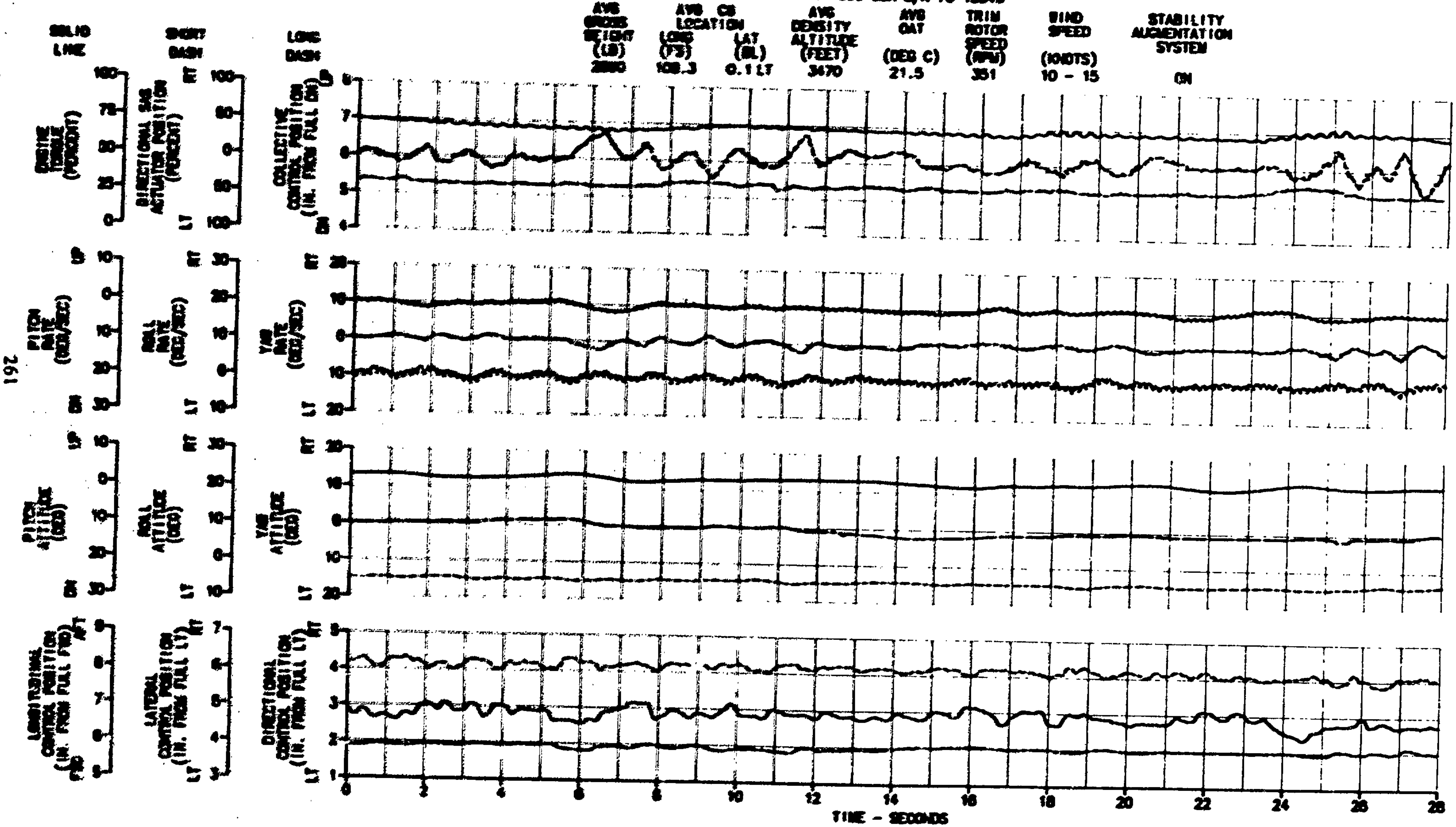


FIGURE E-226
IGE HOVER IN WINDS - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

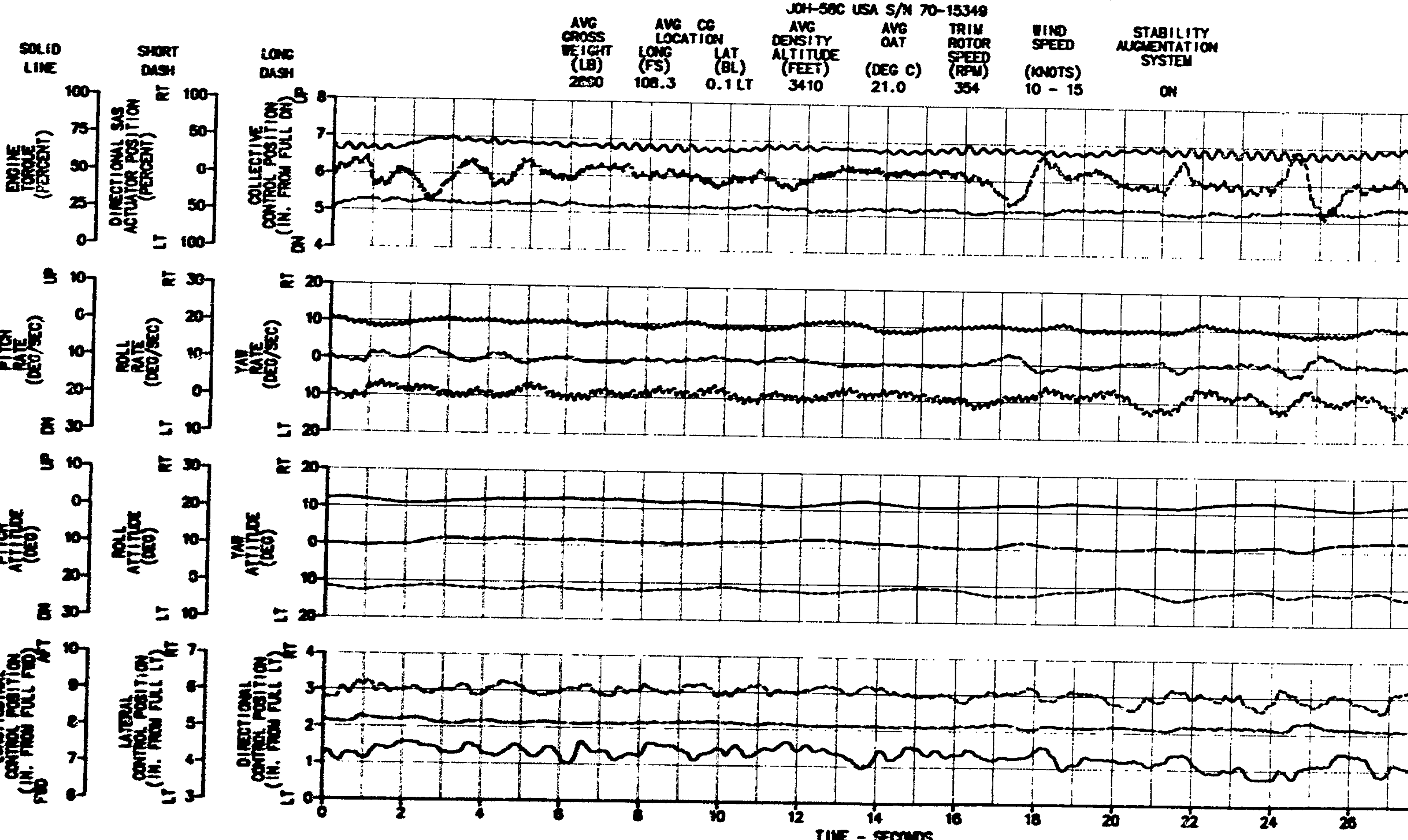


FIGURE E-227
IGE HOVER IN WINDS - 180 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.3	0.1 LT	-3380	20.5	351	10 - 15	OFF

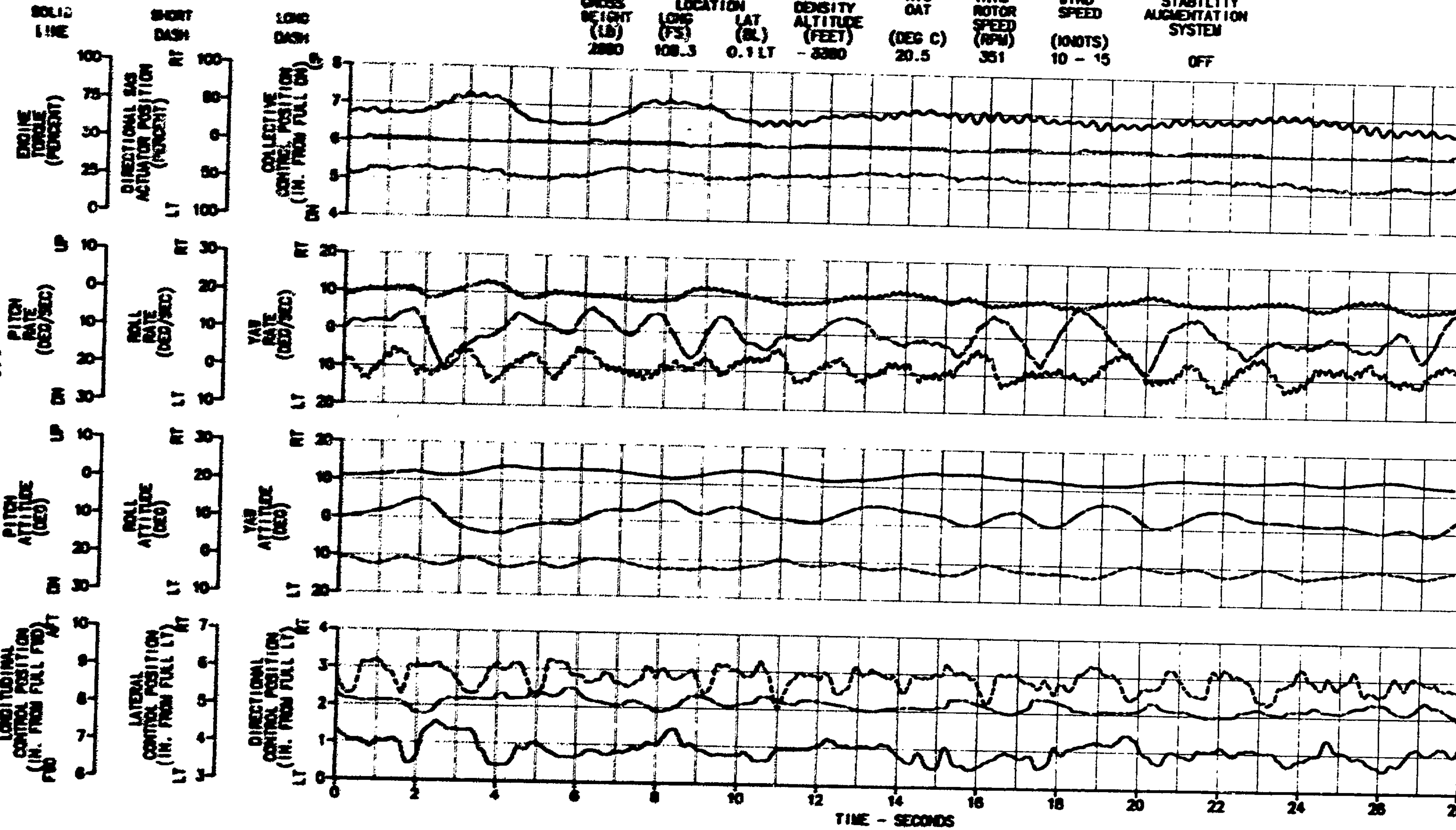


FIGURE E-228
IGE HOVER IN WINDS - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.3	0.1 LT	3420	21.0	355	10 - 15	ON

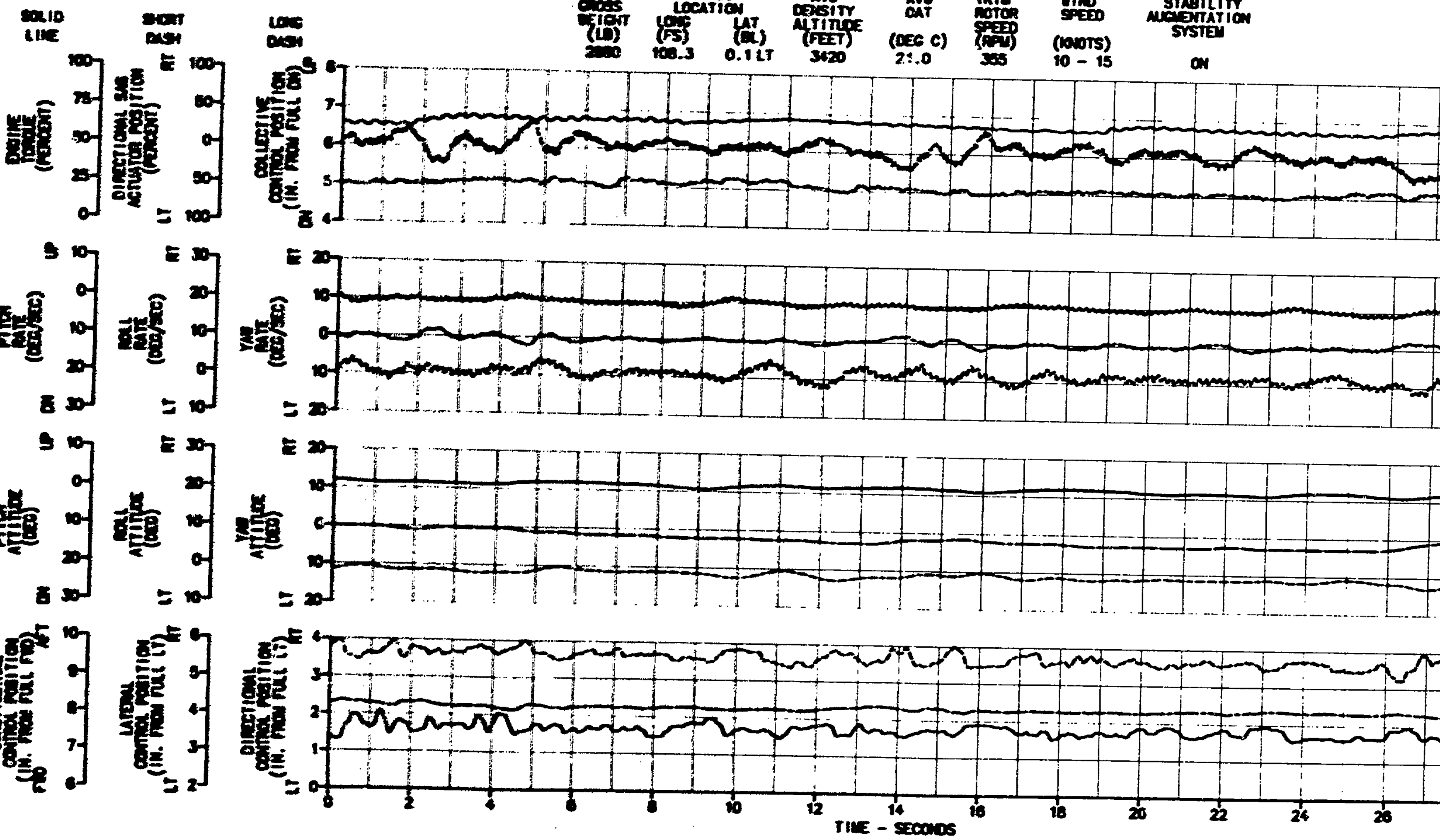


FIGURE E-229
IGE HOVER IN WINDS - 210 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.3	0.1 LT	3430	21.0	353	10 - 15	OFF

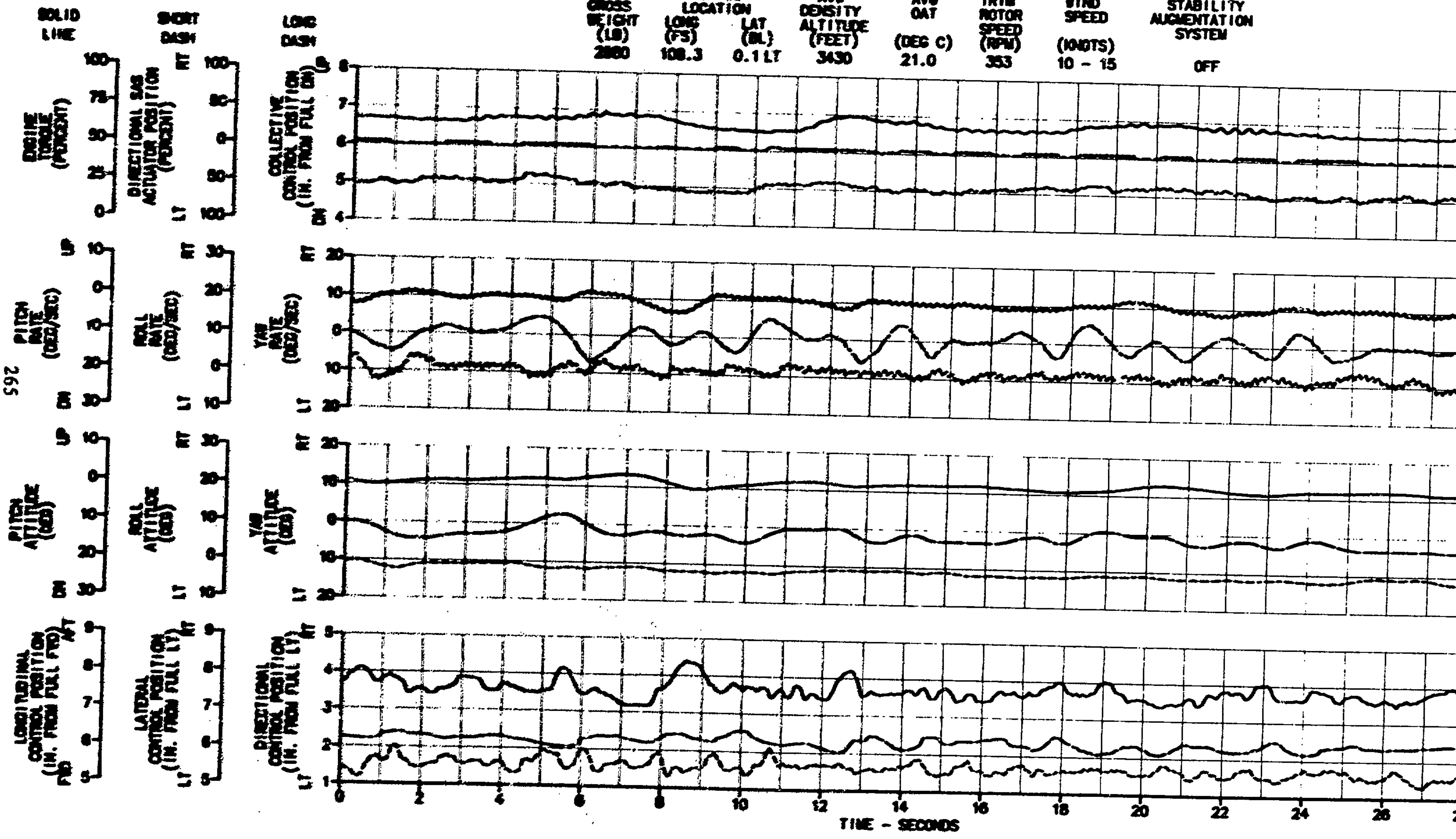


FIGURE E-230
IGE HOVER IN WINDS - 240 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

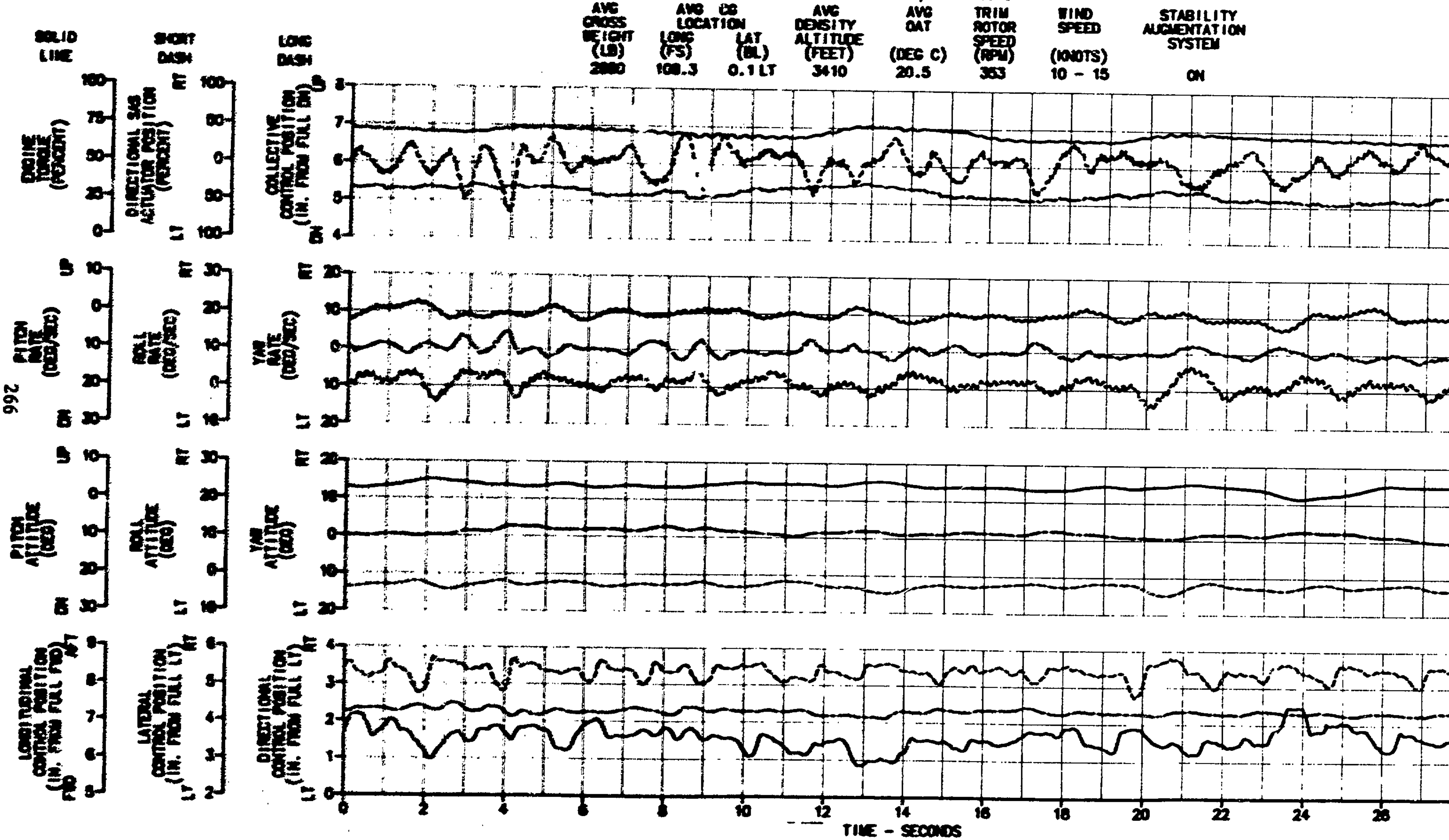


FIGURE E-231

ICE HOVER IN WINDS - 240 DEGREE AZIMUTH

JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	108.3	0.1 LT	3380	20.0	350	10 - 15	OFF

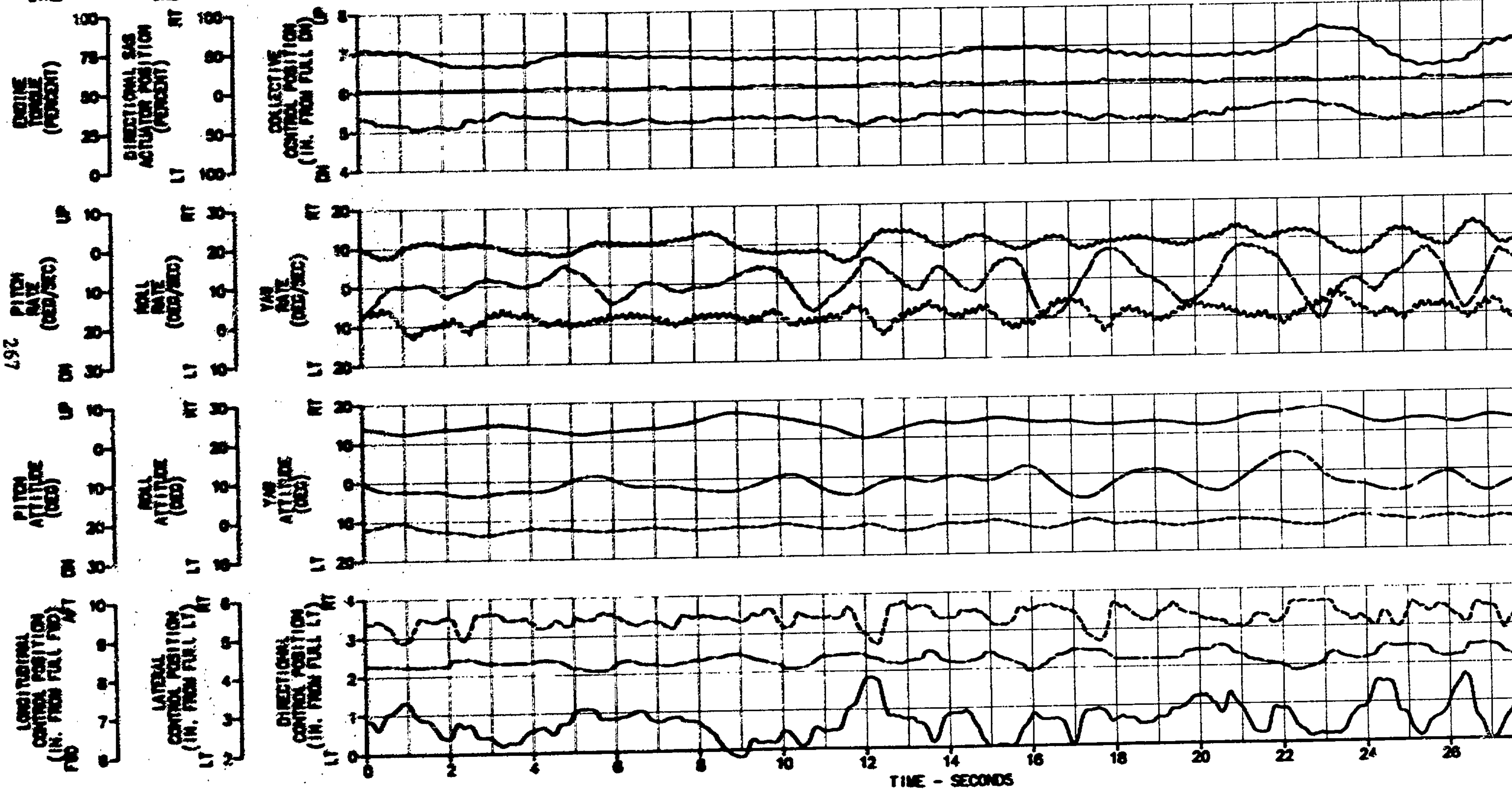


FIGURE E-232
IGE HOVER IN WINDS - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

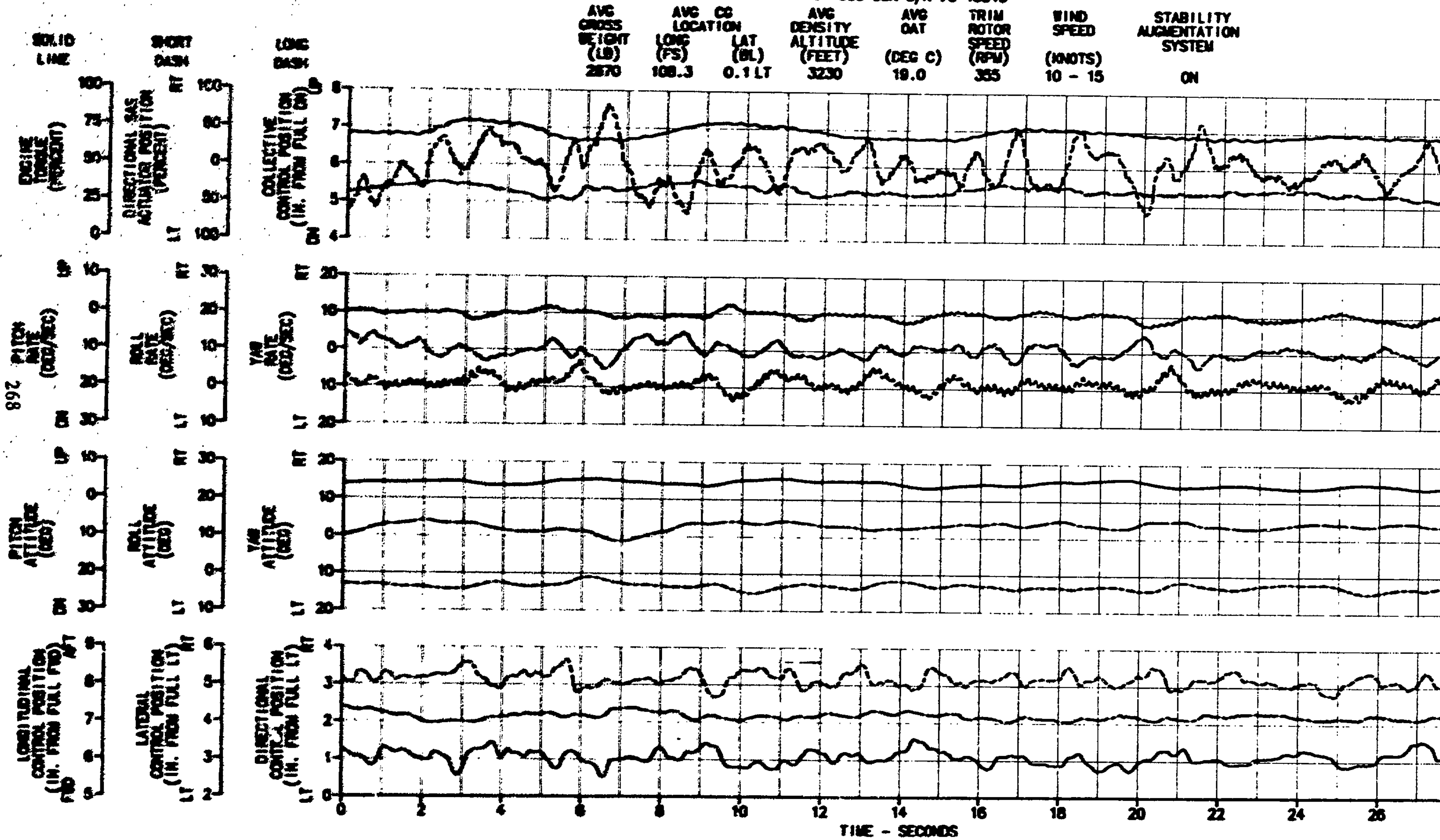


FIGURE E-233
ICE HOVER IN WINDS - 270 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

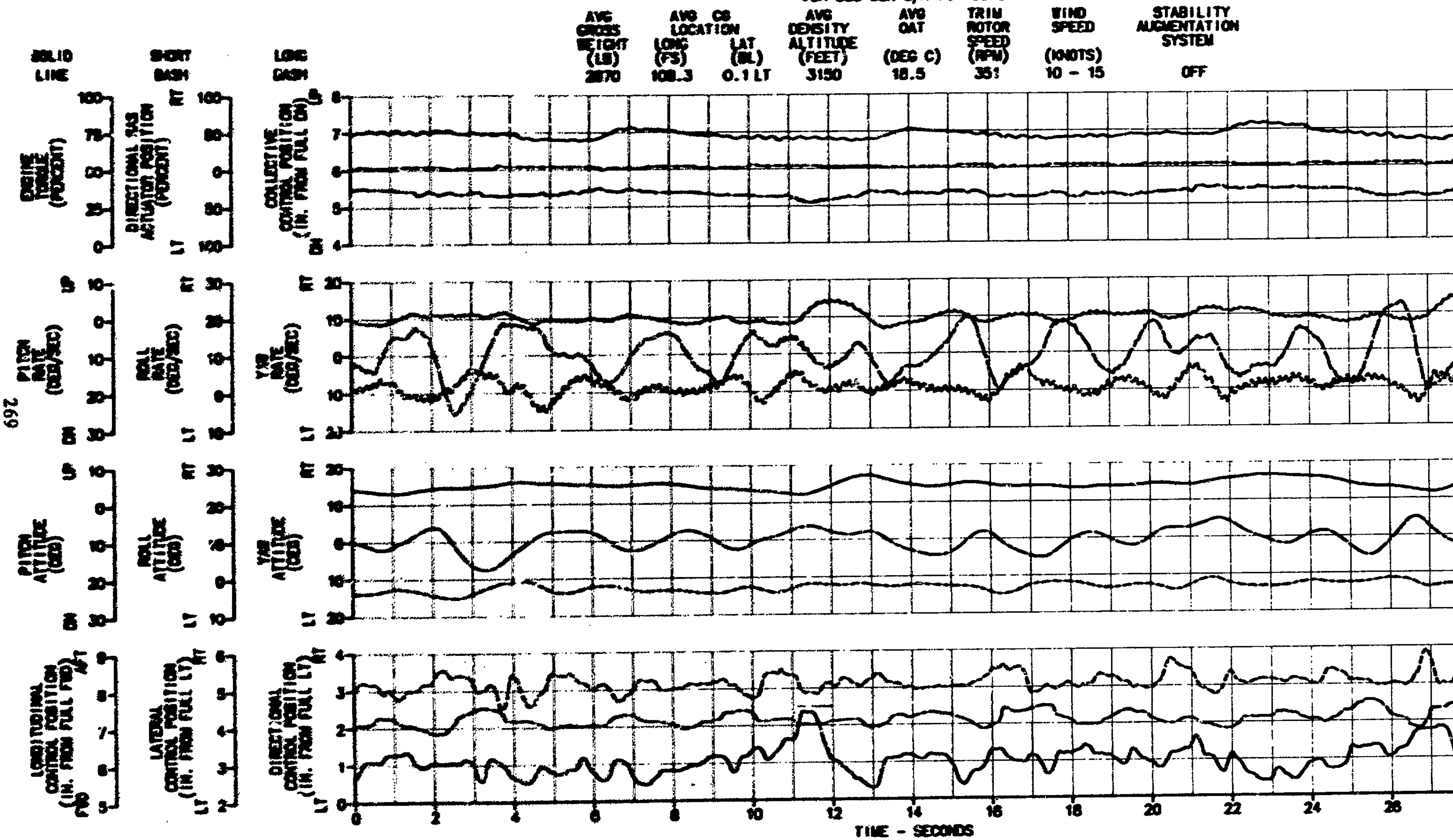


FIGURE E-234
ICE HOVER IN WINDS - 280 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

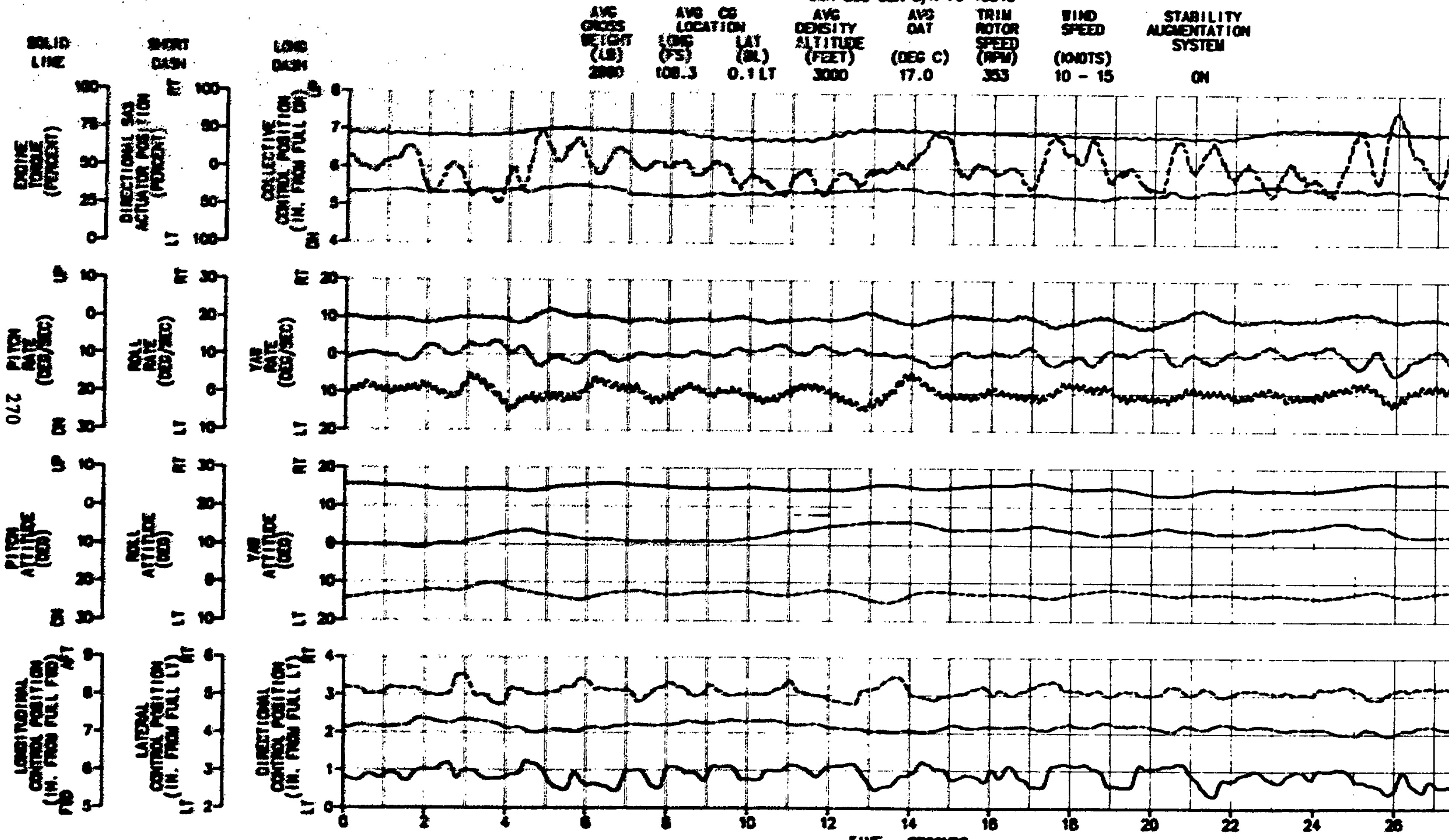


FIGURE E-235
IGE HOVER IN WINDS - 280 DEGREE AZIMUTH
JOH-58C USA S/N 70-15348

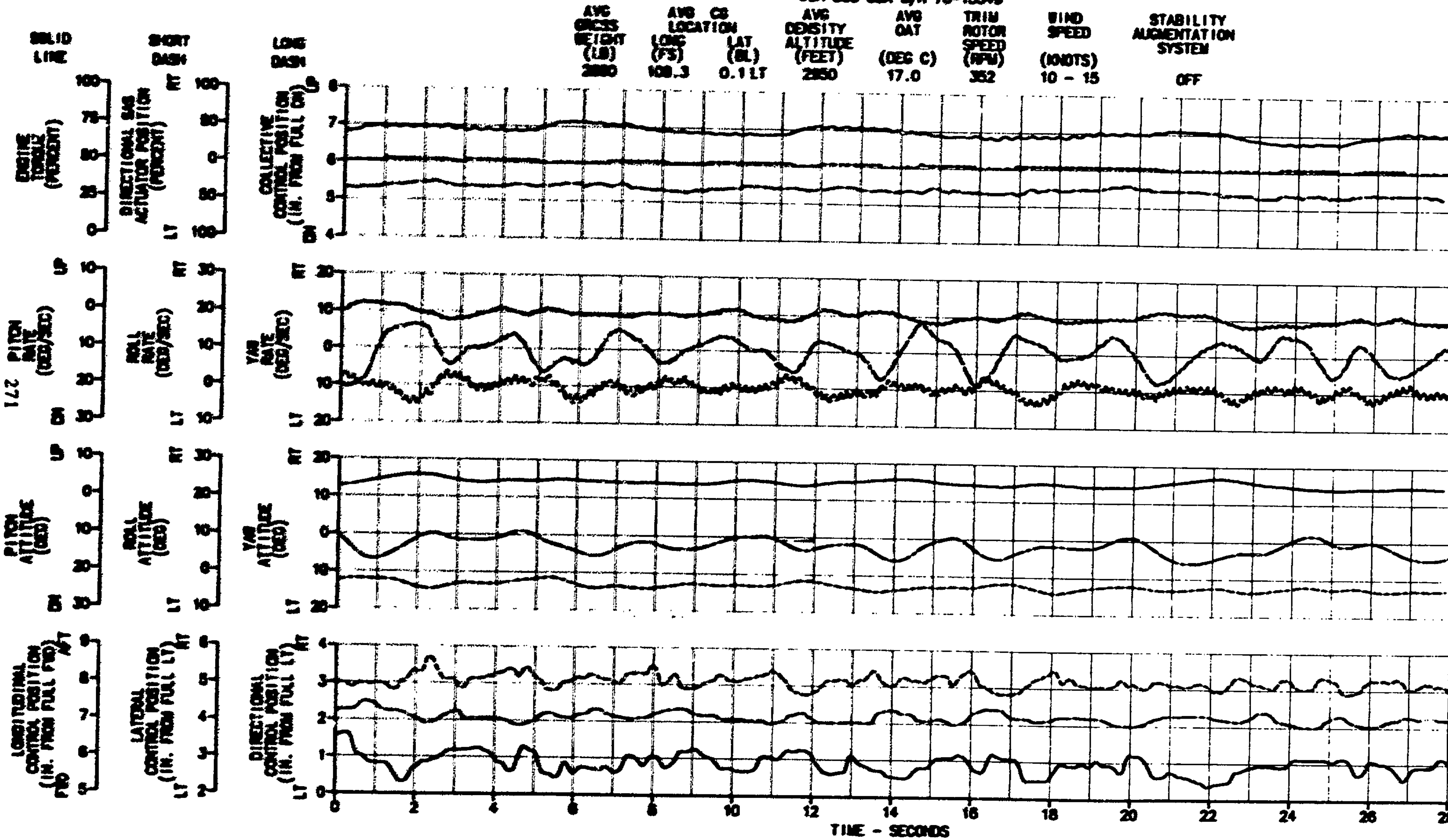


FIGURE E-236
ICE HOVER IN WINDS - 290 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.3	0.1 LT	2900	16.5	353	10 - 15	ON

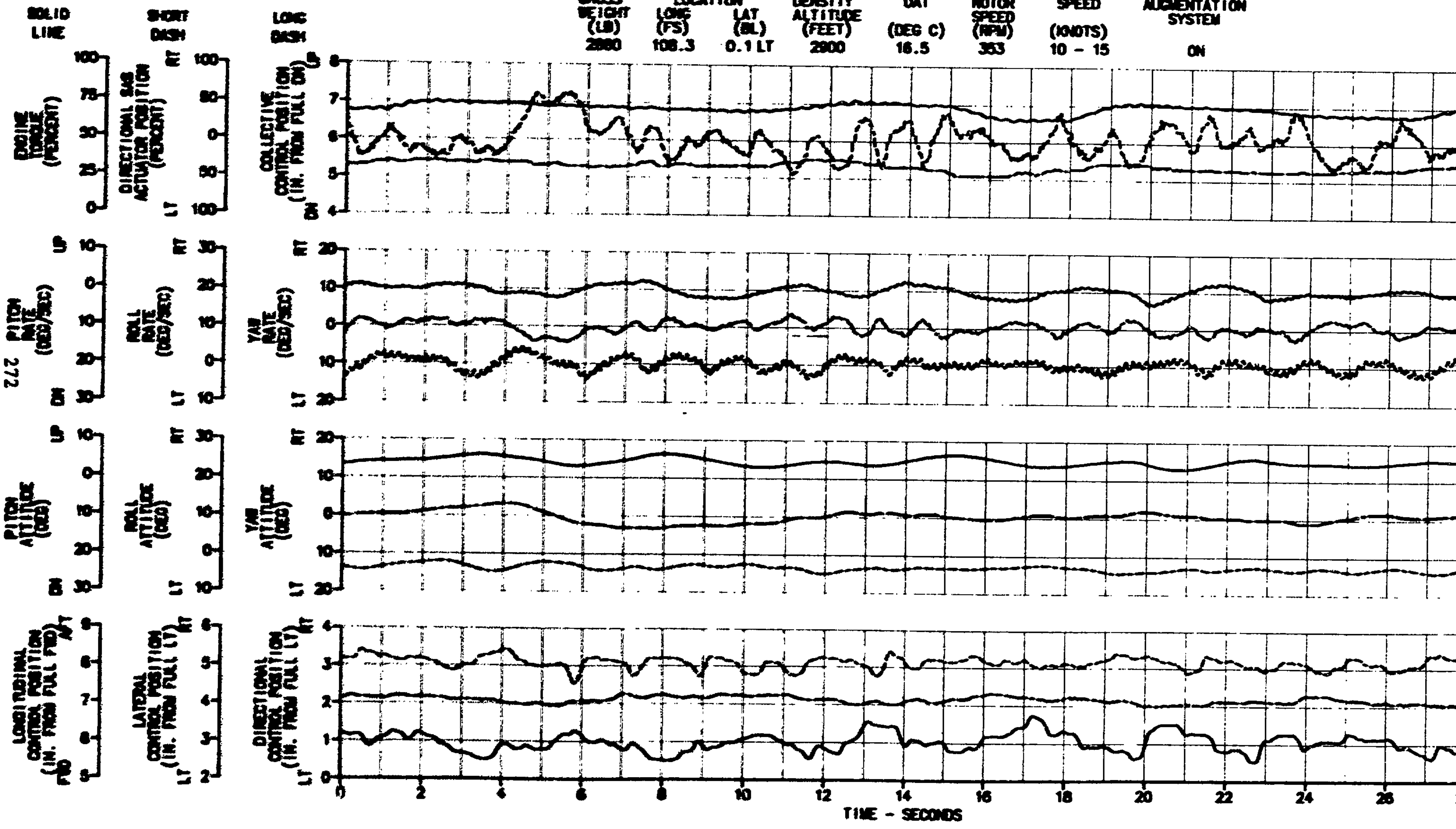


FIGURE E-237
IGE HOVER IN WINDS - 290 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2880	108.3	0.1 LT	2880	16.5	356	10 - 15	OFF

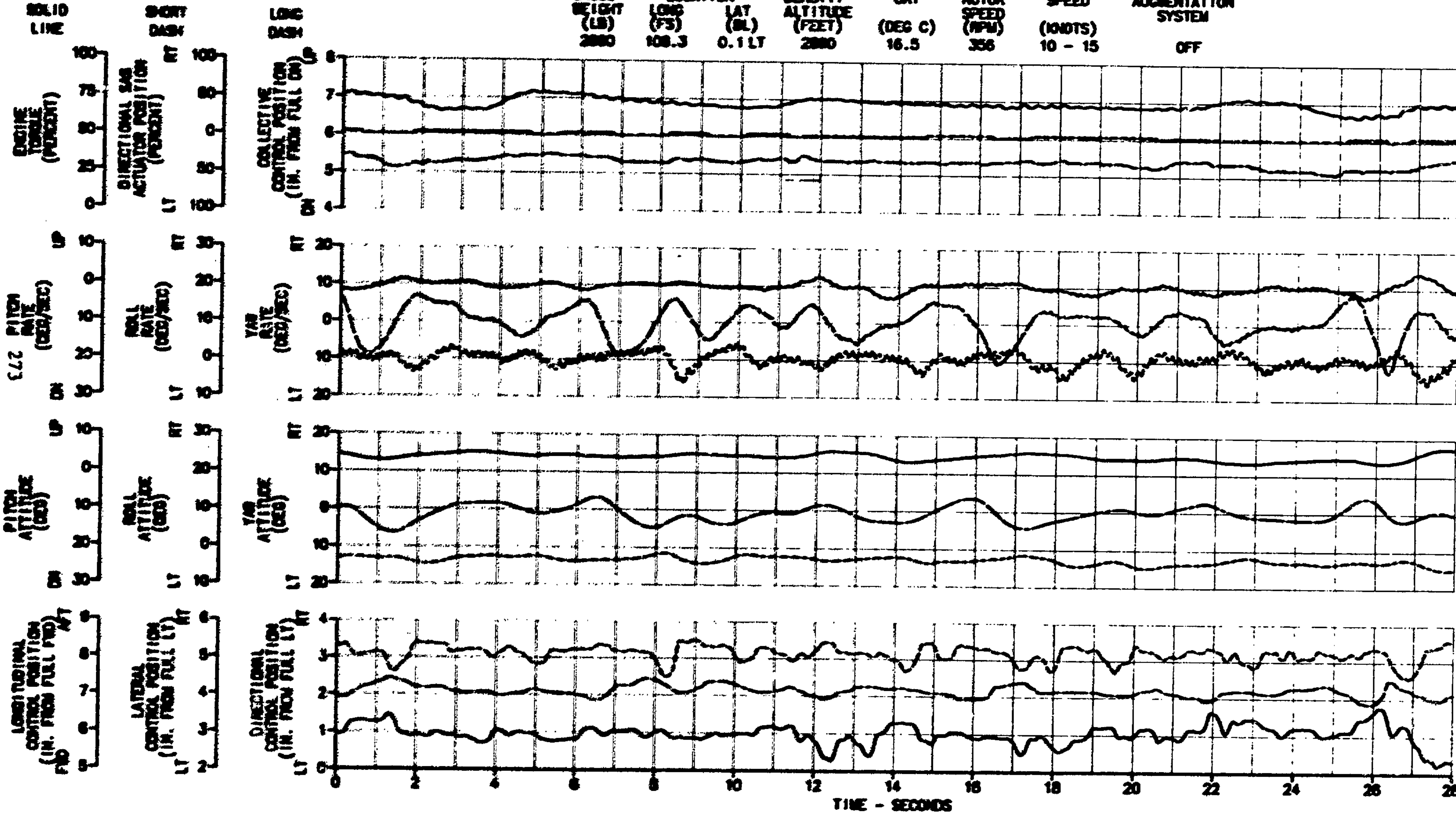


FIGURE E-238
IGE HOVER IN WINDS - 300 AZIMUTH
JOH-58C USA S/N 70-15349

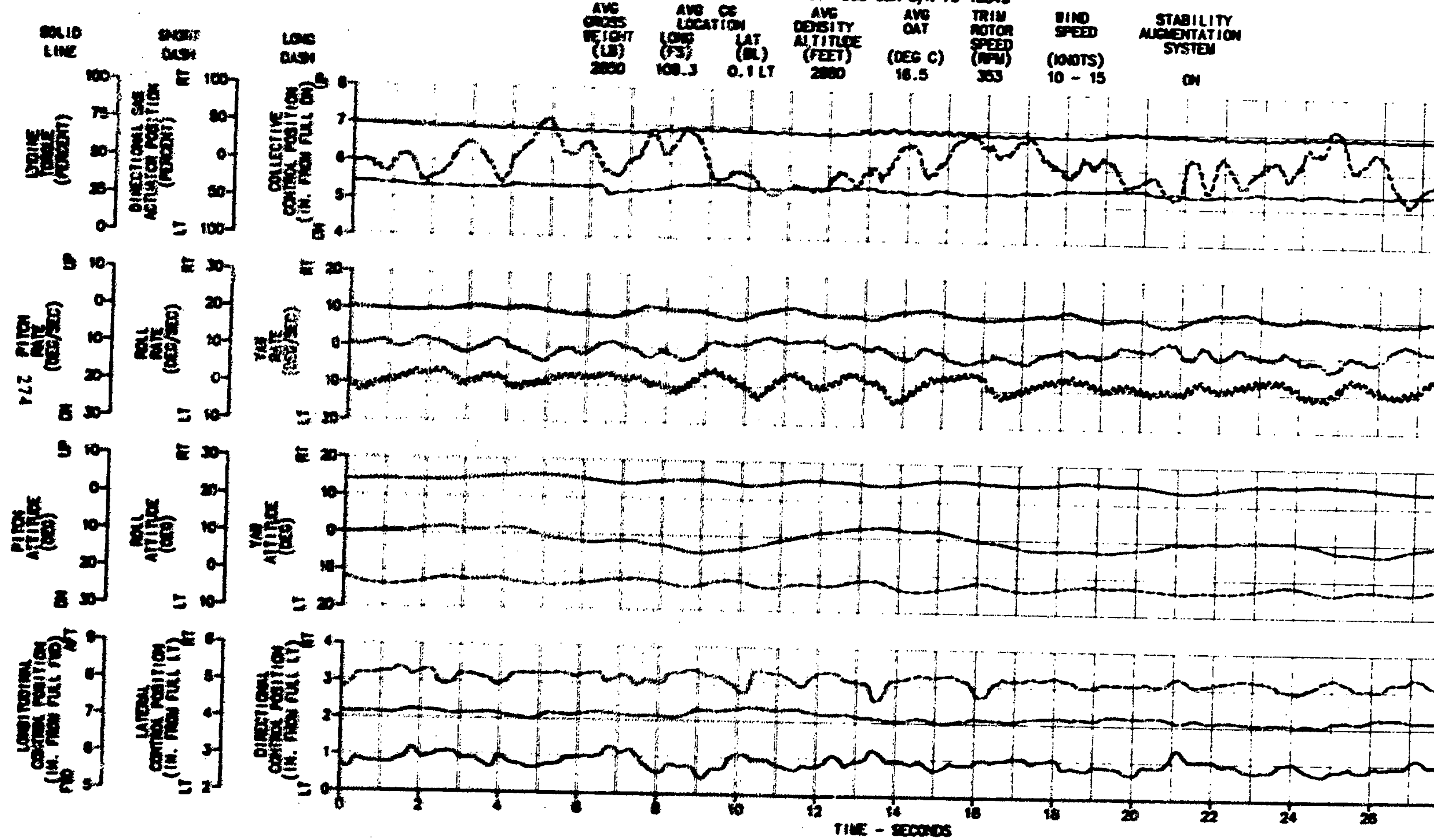


FIGURE E-239
IGE HOVER IN WINDS - 300 DEGREE AZIMUTH
JOH-58C USA S/N 70-15340

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2850	108.3	0.1 LT	2880	16.5	354	10 - 15	OFF

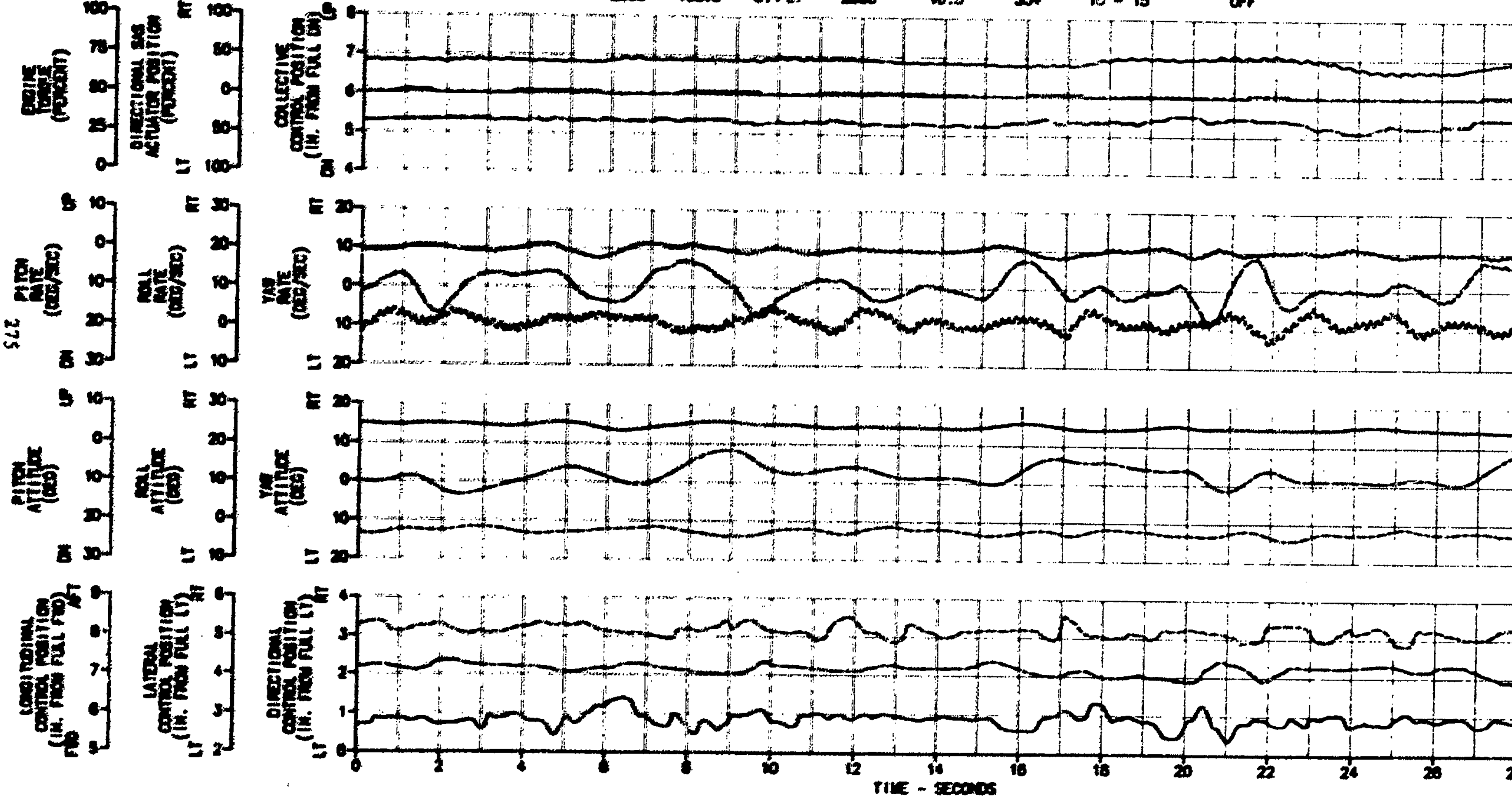


FIGURE E-240

IGE HOVER IN WINDS - 300 DEGREE AZIMUTH

JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2780	108.1	0.0	2870	14.5	353	23 - 36	ON

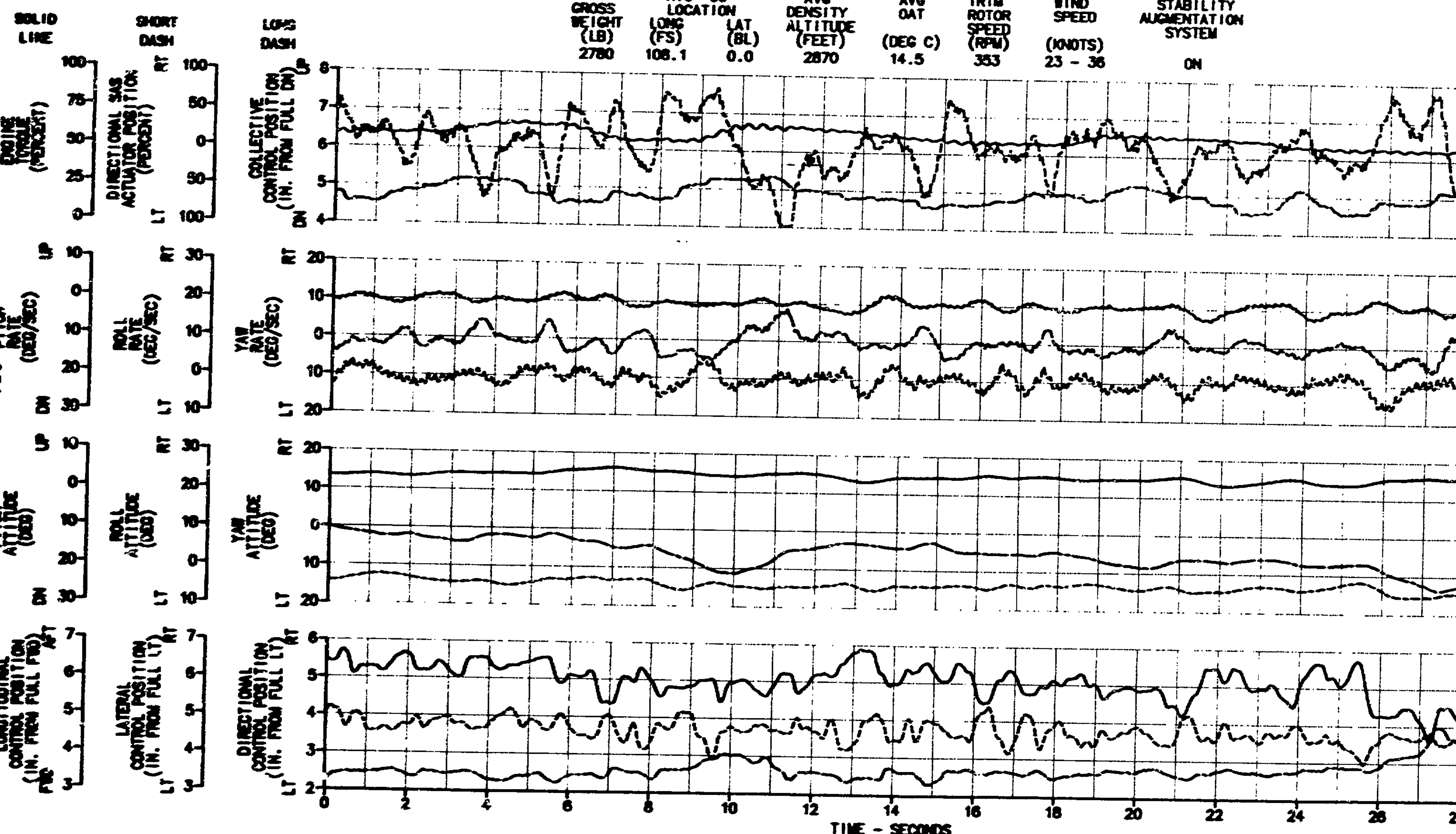
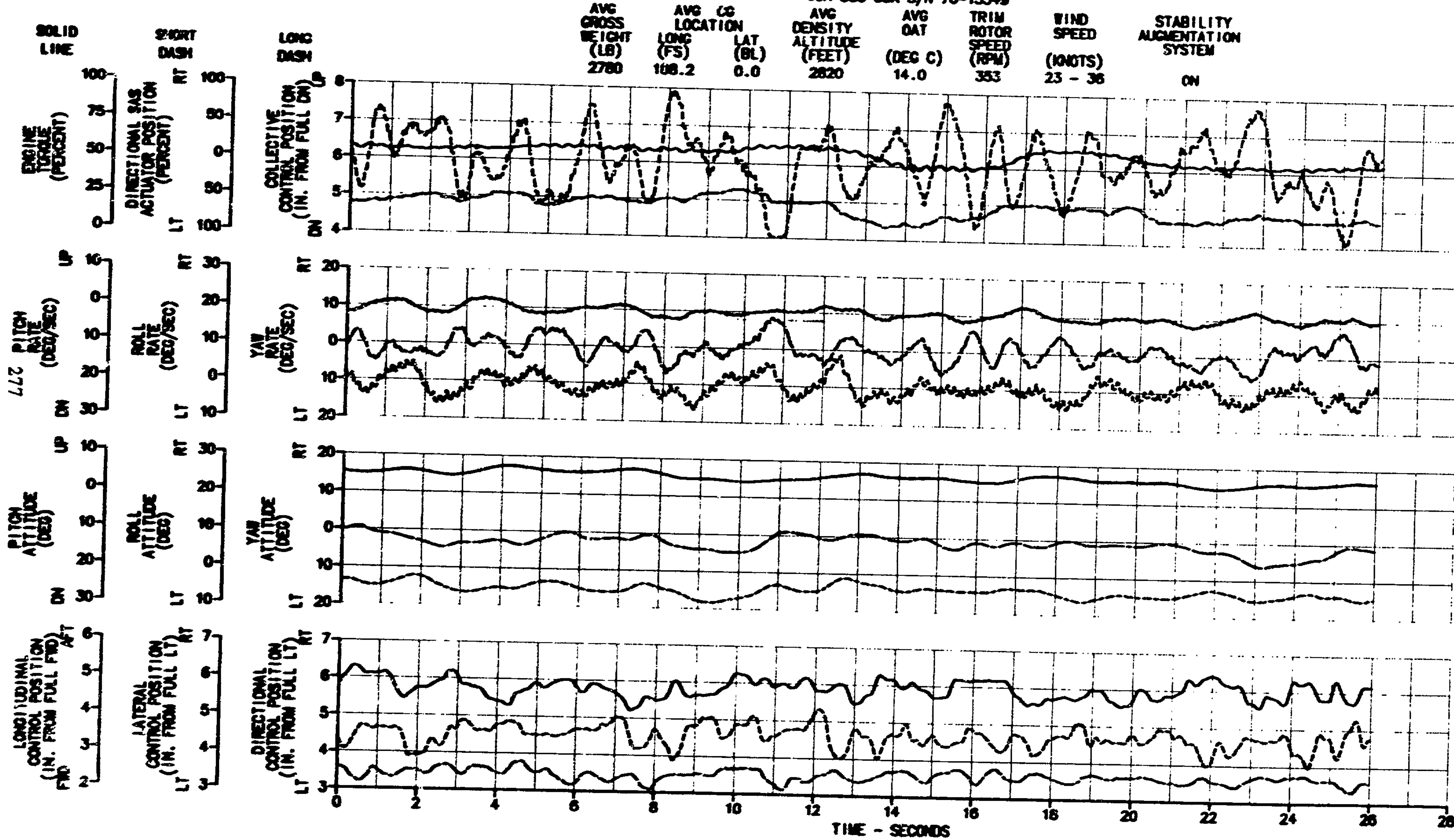


FIGURE E-241
IGE HOVER IN WINDS - 320 DEGREE AZIMUTH
JOH-58C USA S/N 70-15349



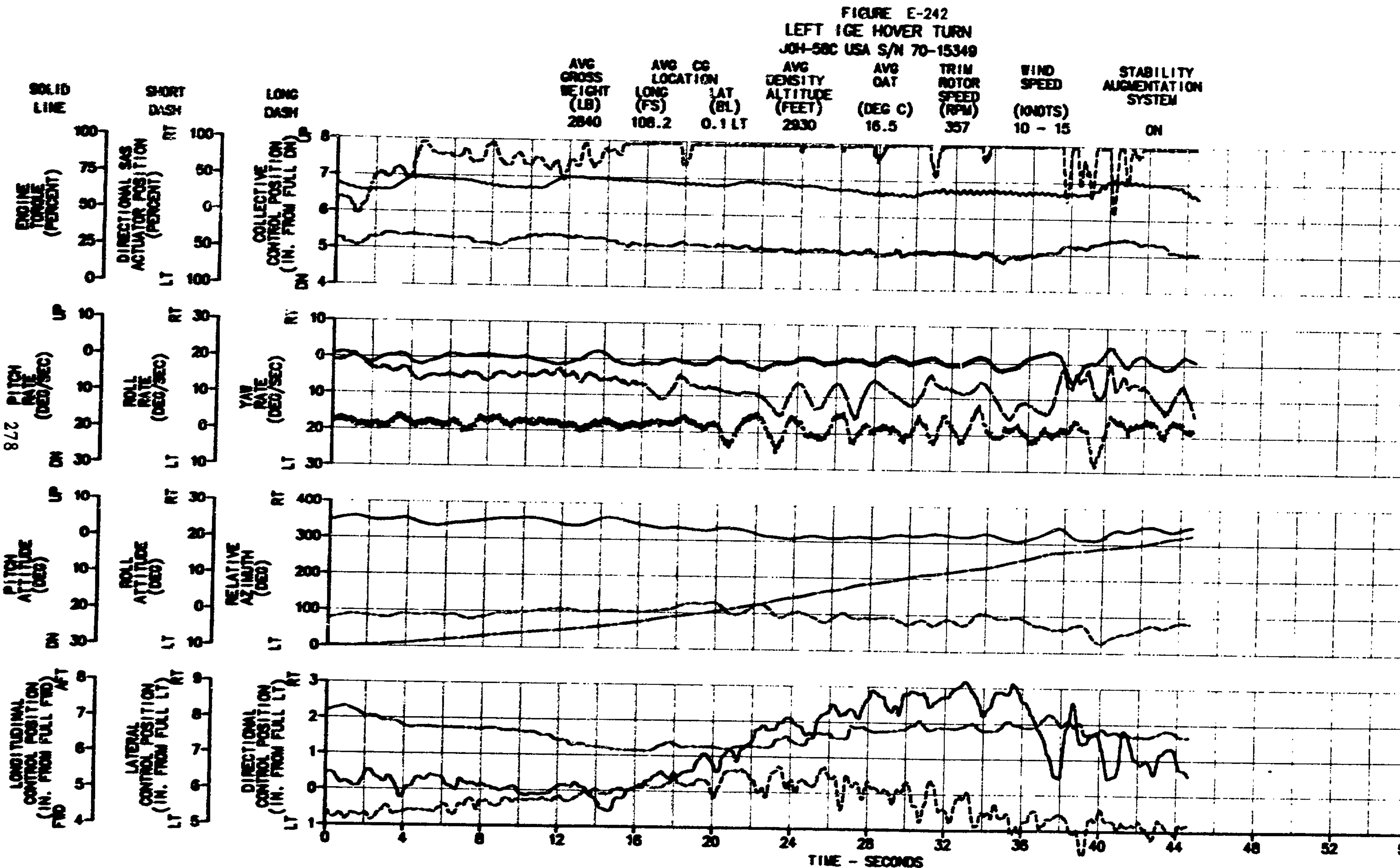


FIGURE E-242
LEFT IGE HOVER TURN
JOH-58C USA S/N 70-15349
AVG GROSS WEIGHT (LB) 2840
AVG CG LOCATION LONG (FS) 108.2 LAT (BL) 0.1 LT
AVG DENSITY ALTITUDE (FEET) 2930
AVG OAT (DEG C) 16.5
TRIM ROTOR SPEED (RPM) 357
WIND SPEED (KNOTS) 10 - 15
STABILITY AUGMENTATION SYSTEM ON
SOLID LINE
SHORT DASH
LONG DASH
ENGINE TORQUE (PERCENT)
DIRECTIONAL SAS ACTUATOR POSITION (PERCENT)
COLLECTIVE CONTROL POSITION (IN. FROM FULL DN)
PITCH RATE (DEG/SEC)
ROLL RATE (DEG/SEC)
YAW RATE (DEG/SEC)
PITCH ATTITUDE (DEG)
ROLL ATTITUDE (DEG)
RELATIVE AZIMUTH (DEG)
LONGITUDINAL CONTROL POSITION (IN. FROM FULL FWD)
LATERAL CONTROL POSITION (IN. FROM FULL LT)
DIRECTIONAL CONTROL POSITION (IN. FROM FULL LT)
TIME - SECONDS

FIGURE E-243
LEFT IGE HOVER TURN
JOH-58C USA S/N 70-15349

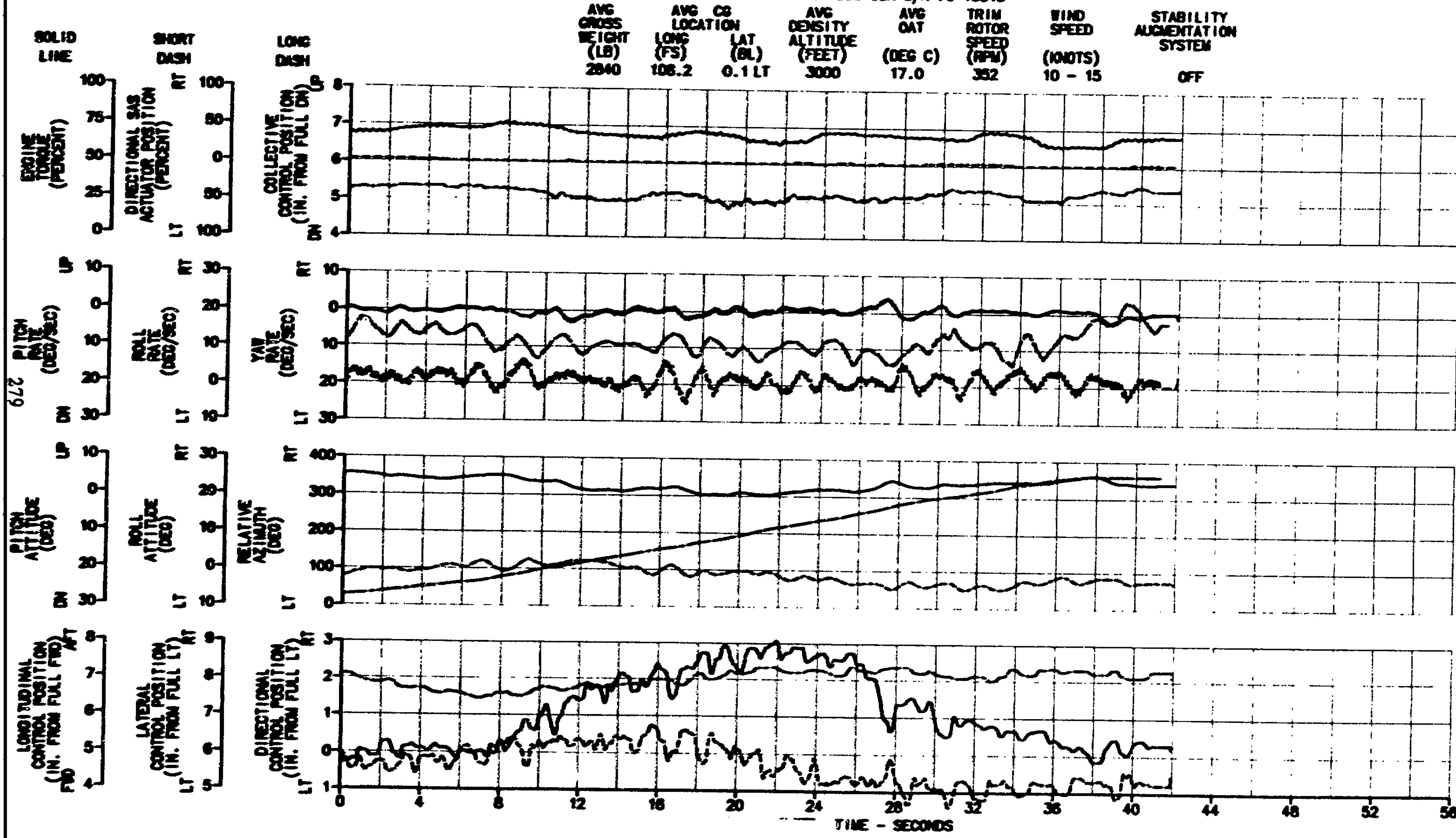


FIGURE E-244
LEFT IGE HOVER TURN
JOH-58C USA S/N 70-15349

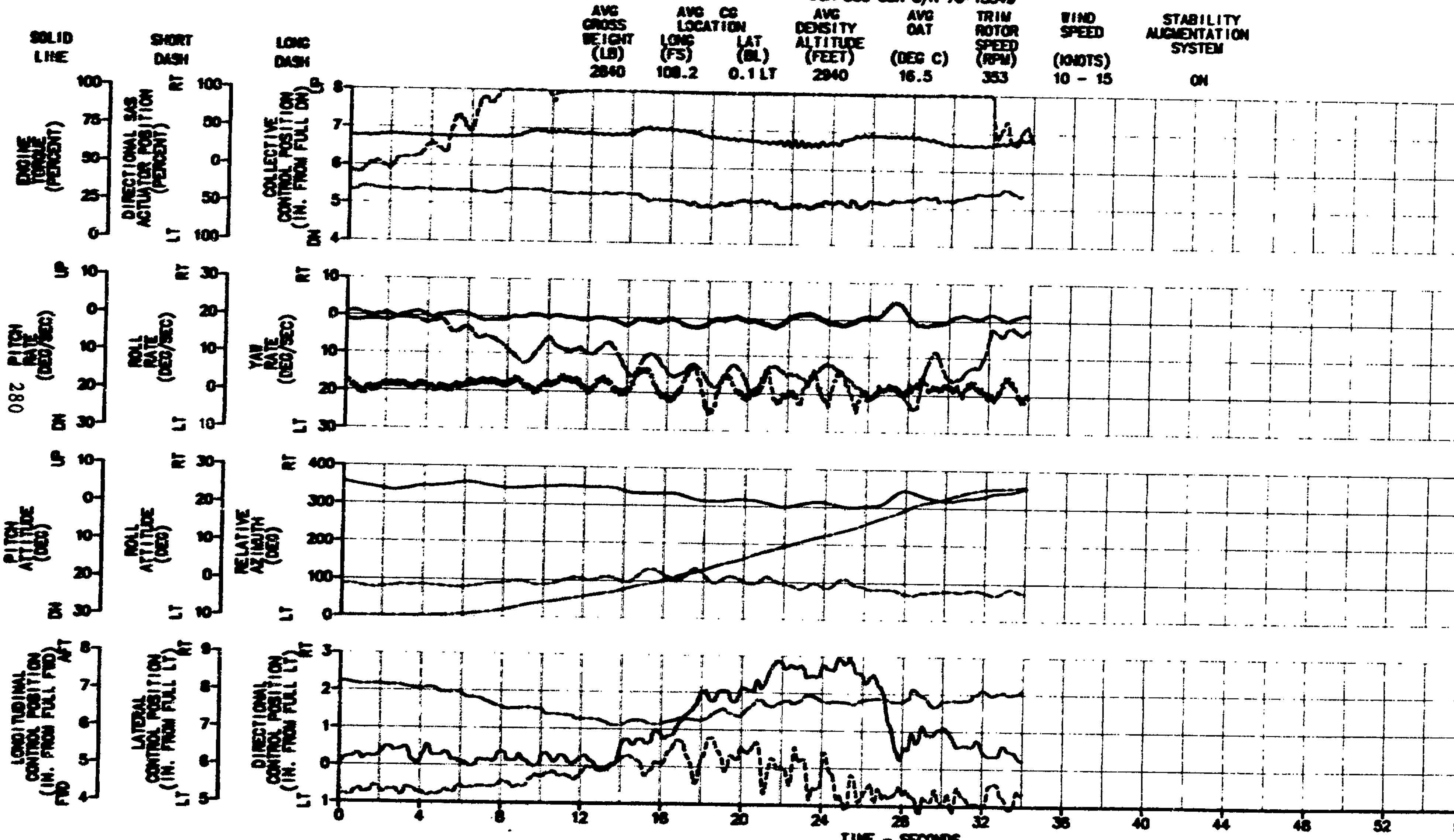


FIGURE E-245
LEFT IGE HOVER TURN
JOH-58C USA S/N 70-15348

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2830	108.2	0.1 LT	2980	17.0	352	10 - 15	OFF

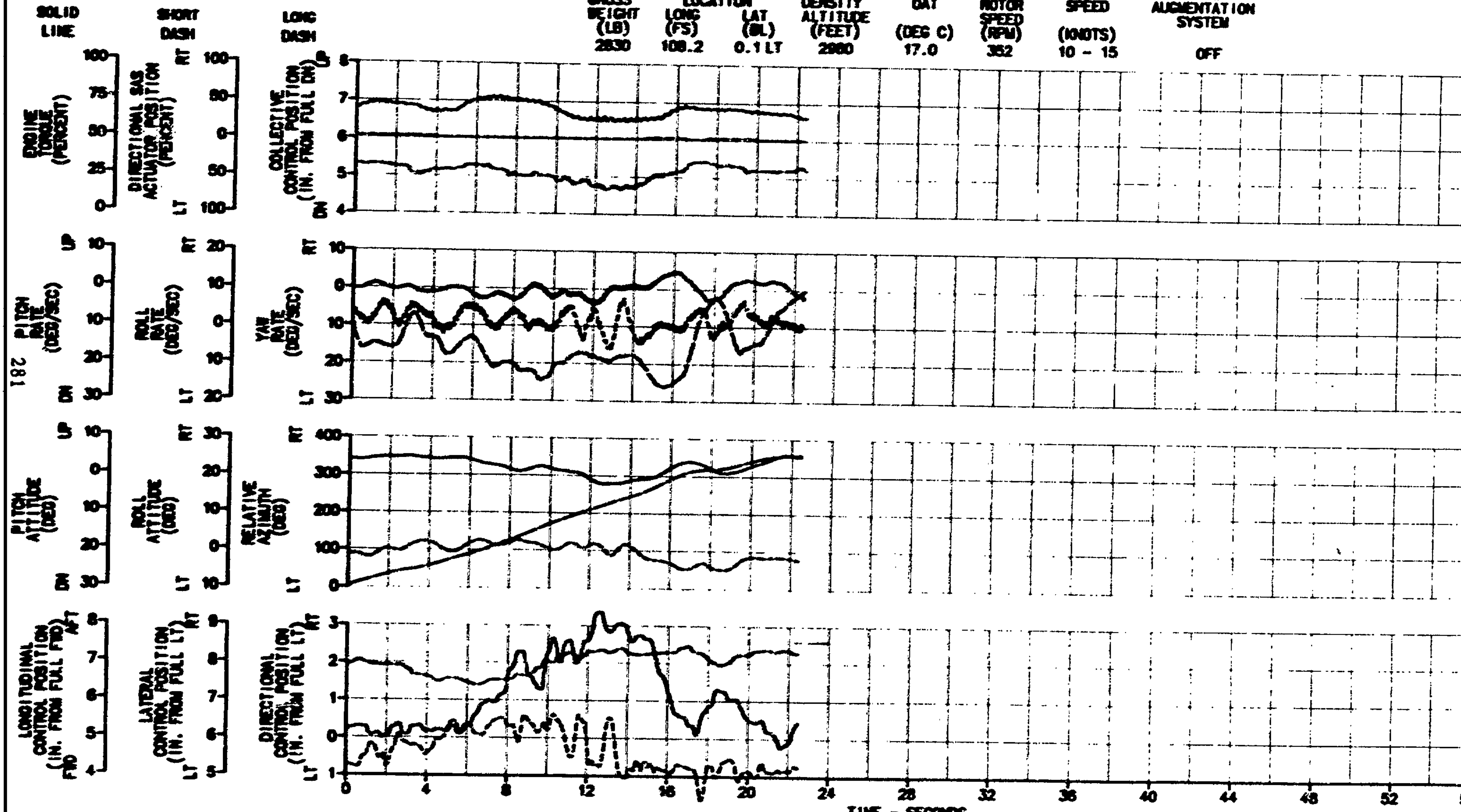


FIGURE E-246
RIGHT IGE HOVER TURN
JOH-58C USA S/N 70-15340

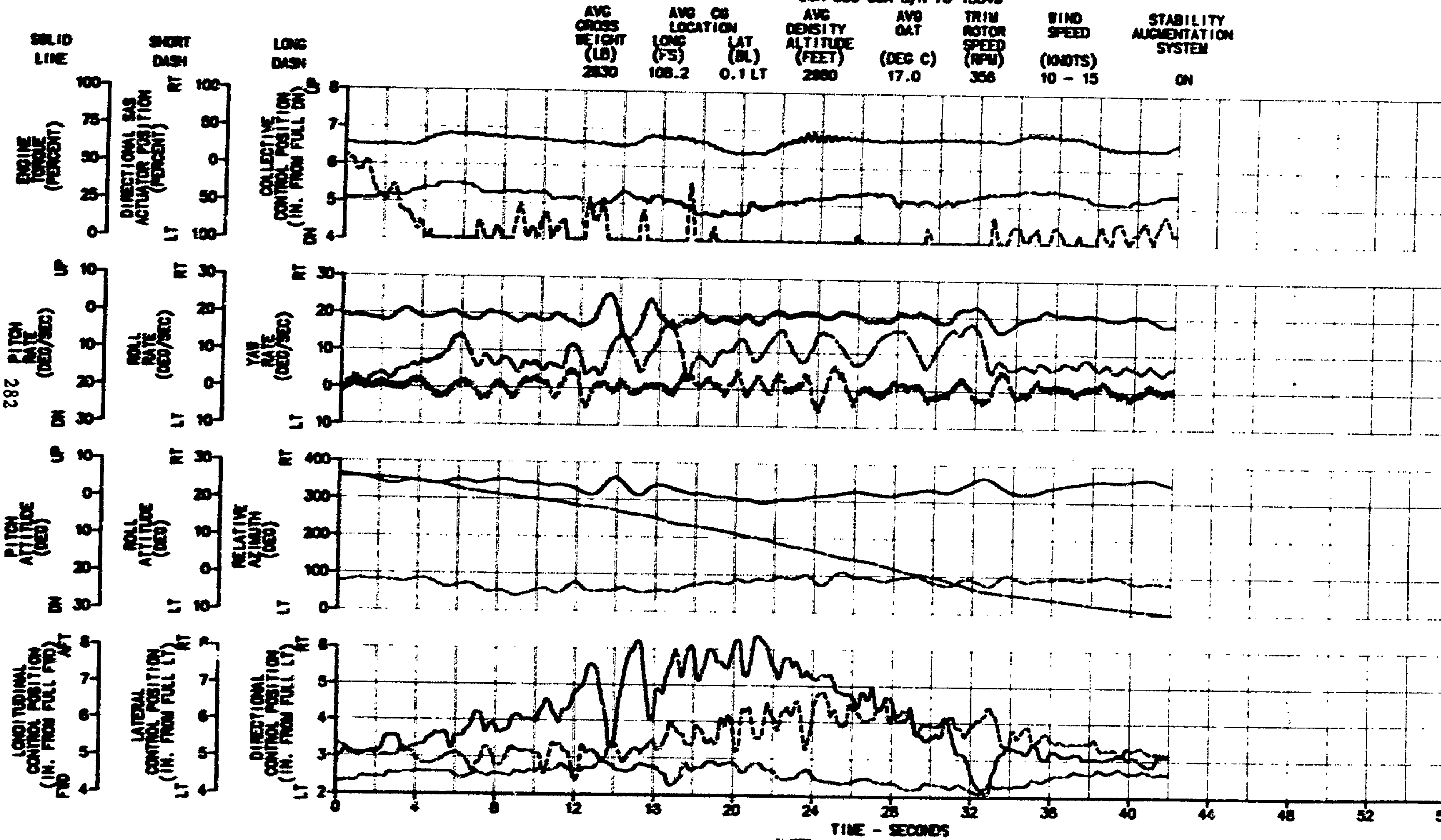


FIGURE E-247
RIGHT IGE HOVER TURN
JOH-58C USA S/N 70-15349

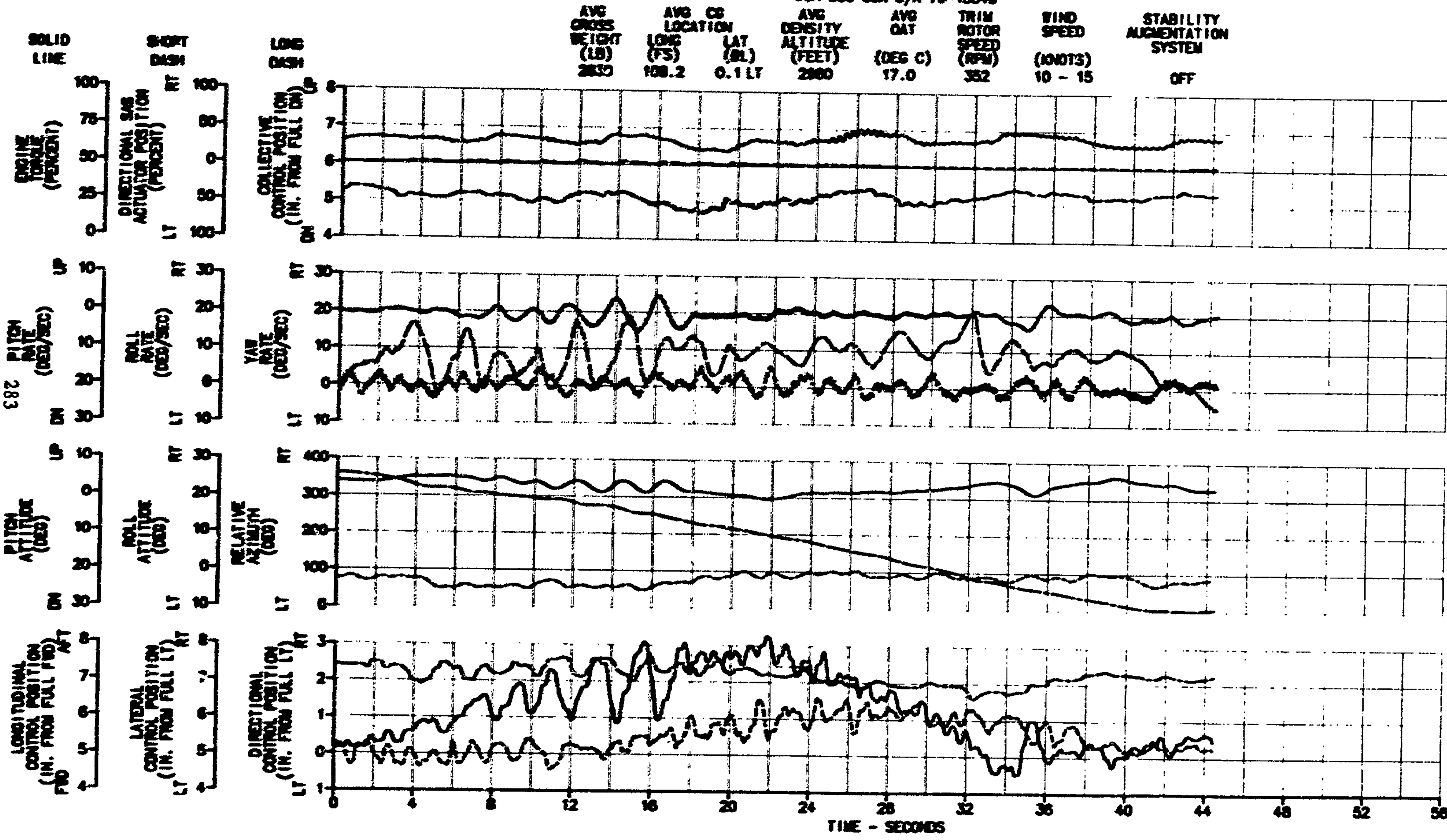


FIGURE E-248
RIGHT IGE HOVER TURN
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2870	108.3	0.0	2800	13.5	357	23 - 38	ON

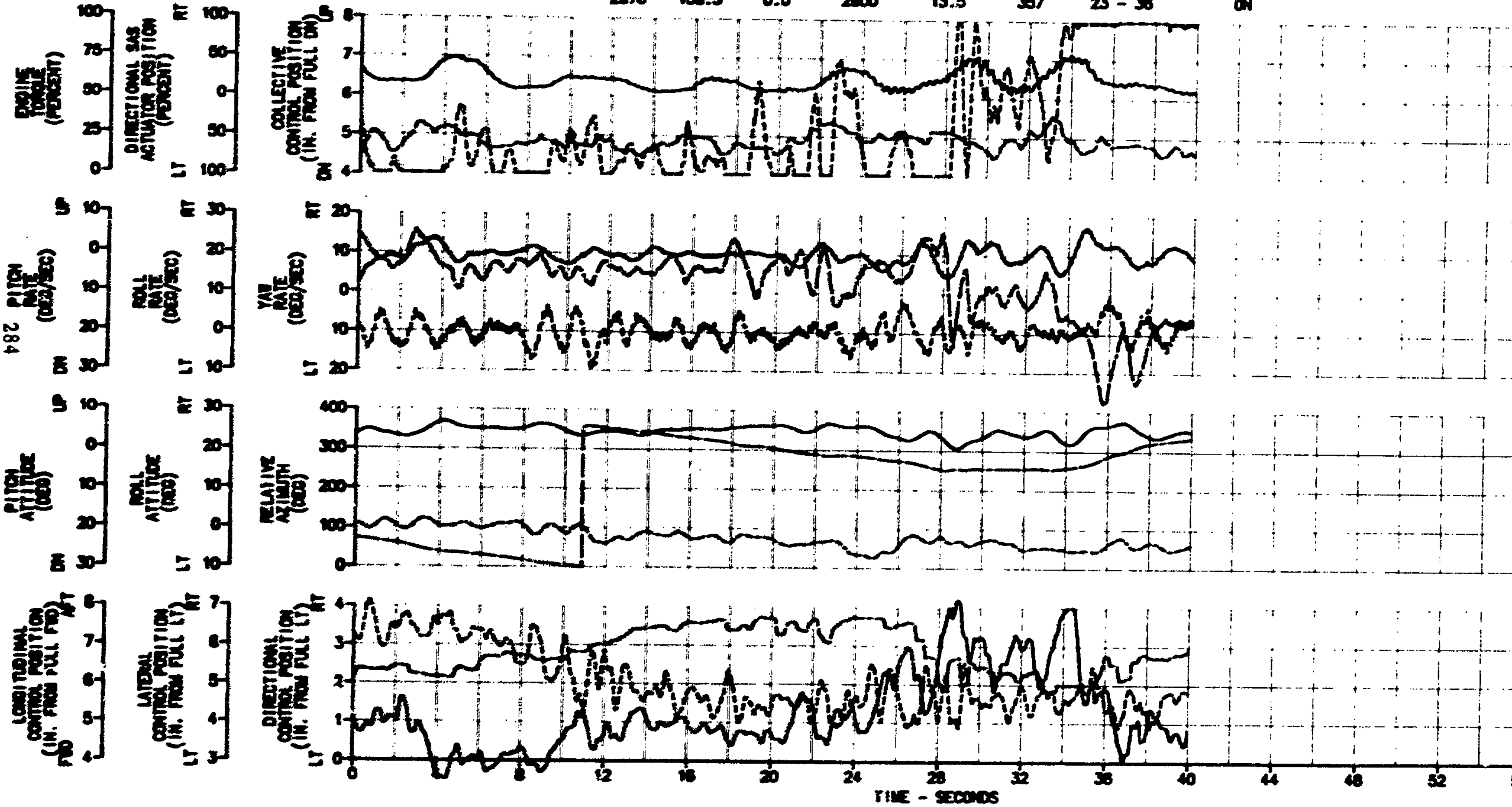


FIGURE E-249
QUICK STOP INTO THE WIND
JOH-58C USA S/N 70-15349

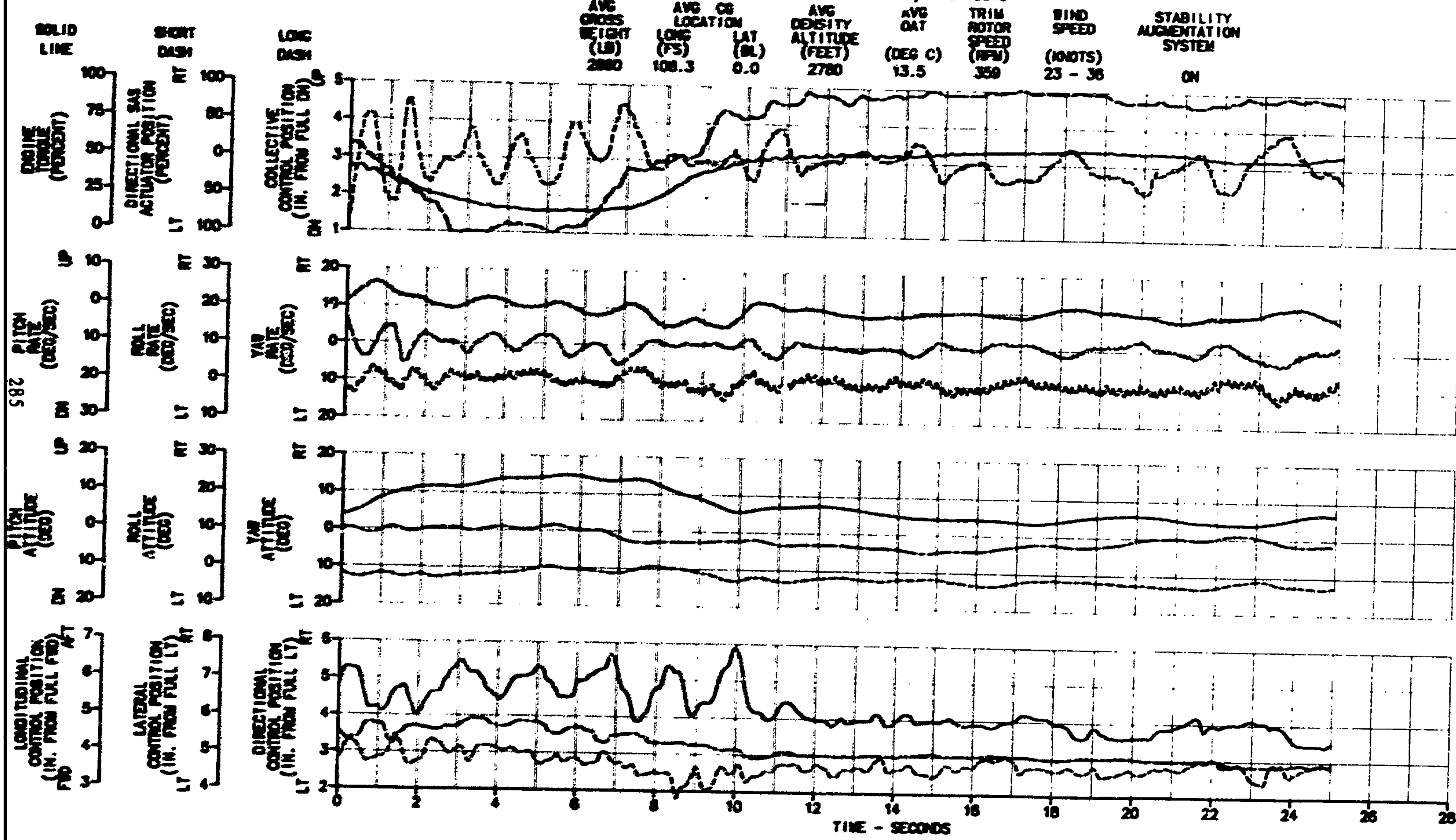


FIGURE E-250
QUICK STOP INTO THE WIND
JOH-58C USA S/N 70-15340

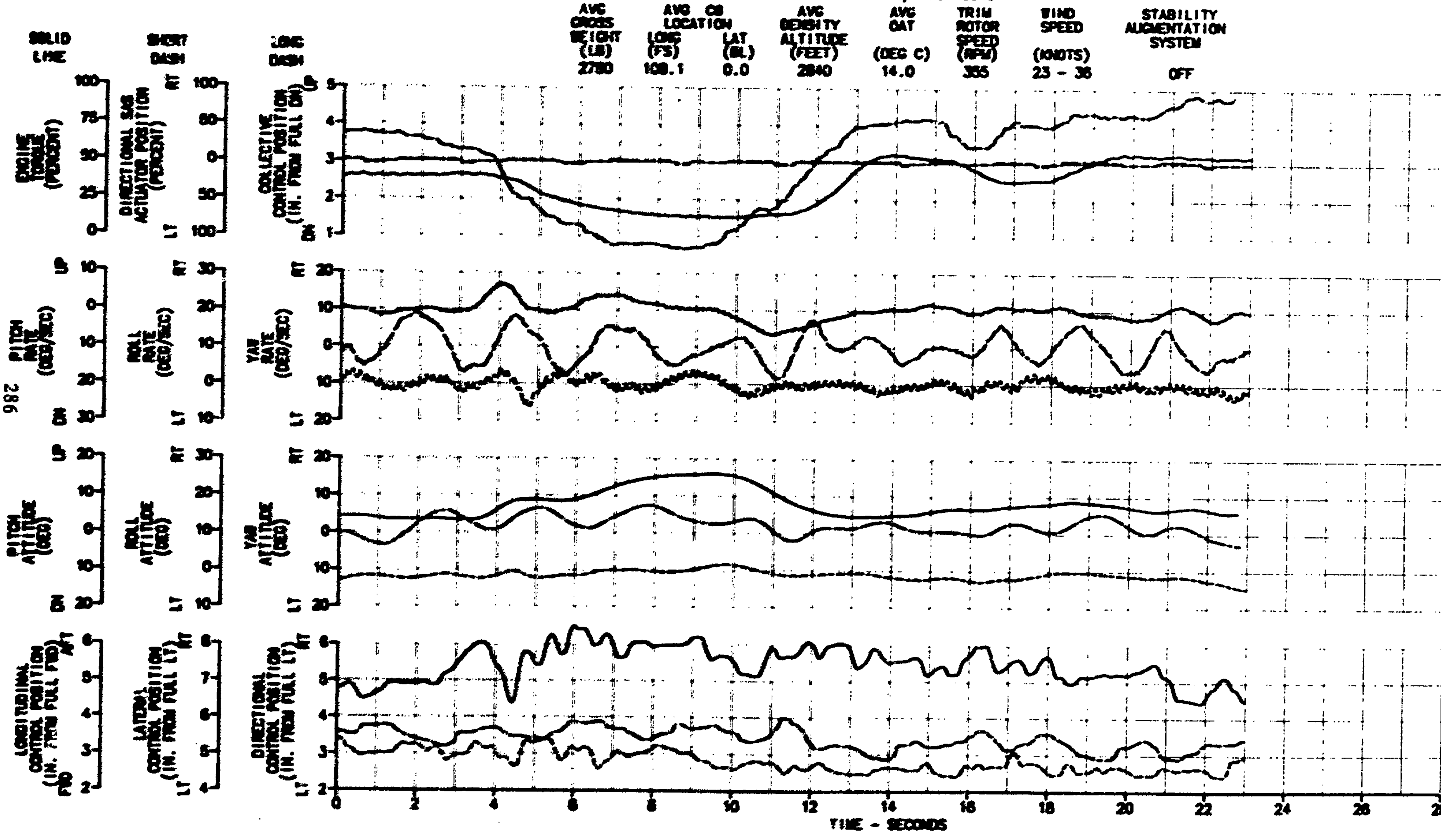


FIGURE E-251
TAKE OFF TO A HOVER
JOH-58C USA S/N 70-15349

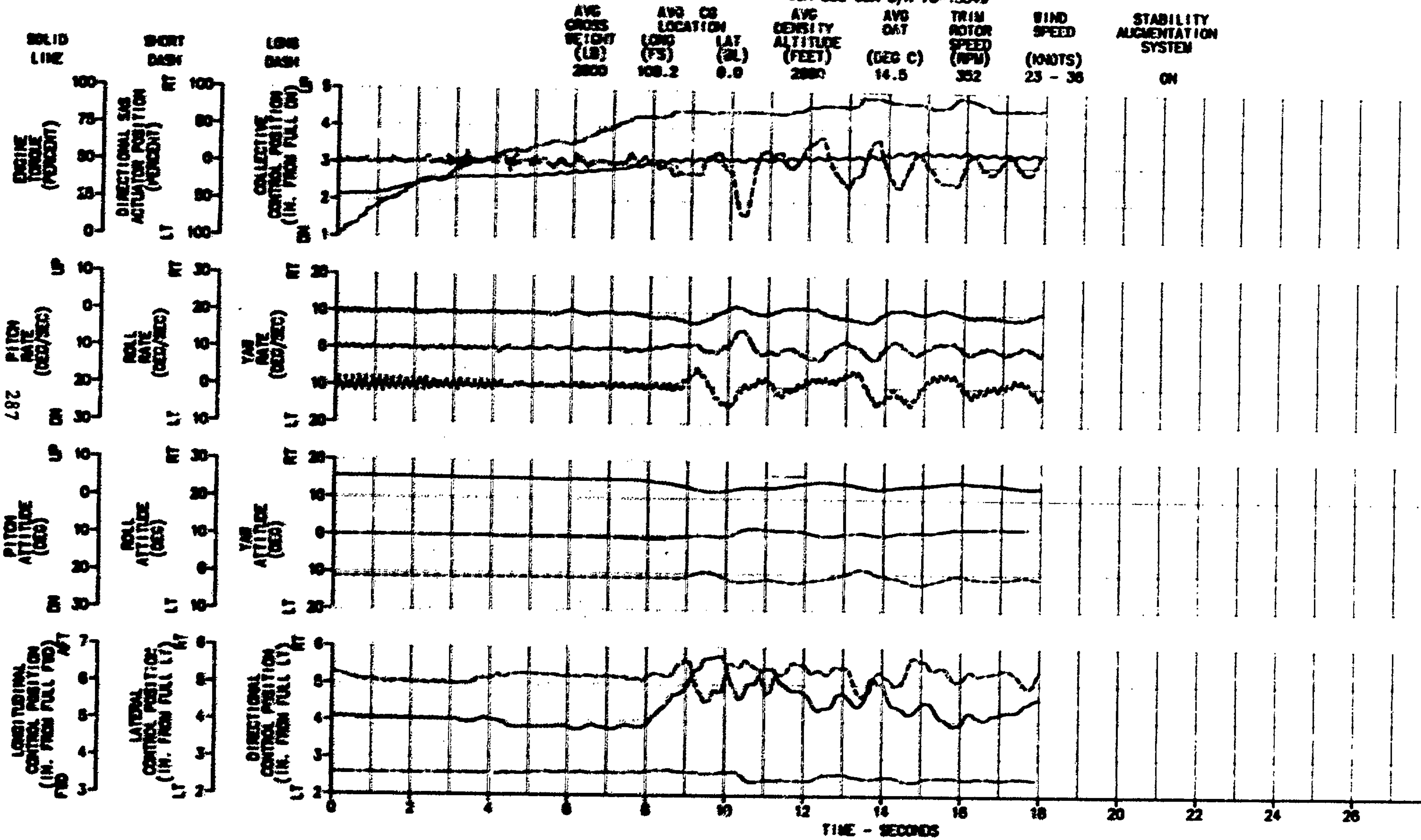


FIGURE E-252
TAKEOFF TO A HOVER
JOH-58C USA S/N 70-15349

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FEET)	AVG OAT (DEG C)	TRIM ROTOR SPEED (RPM)	WIND SPEED (KNOTS)	STABILITY AUGMENTATION SYSTEM
2800	108.2	0.0	2830	14.0	353	23 - 36	OFF

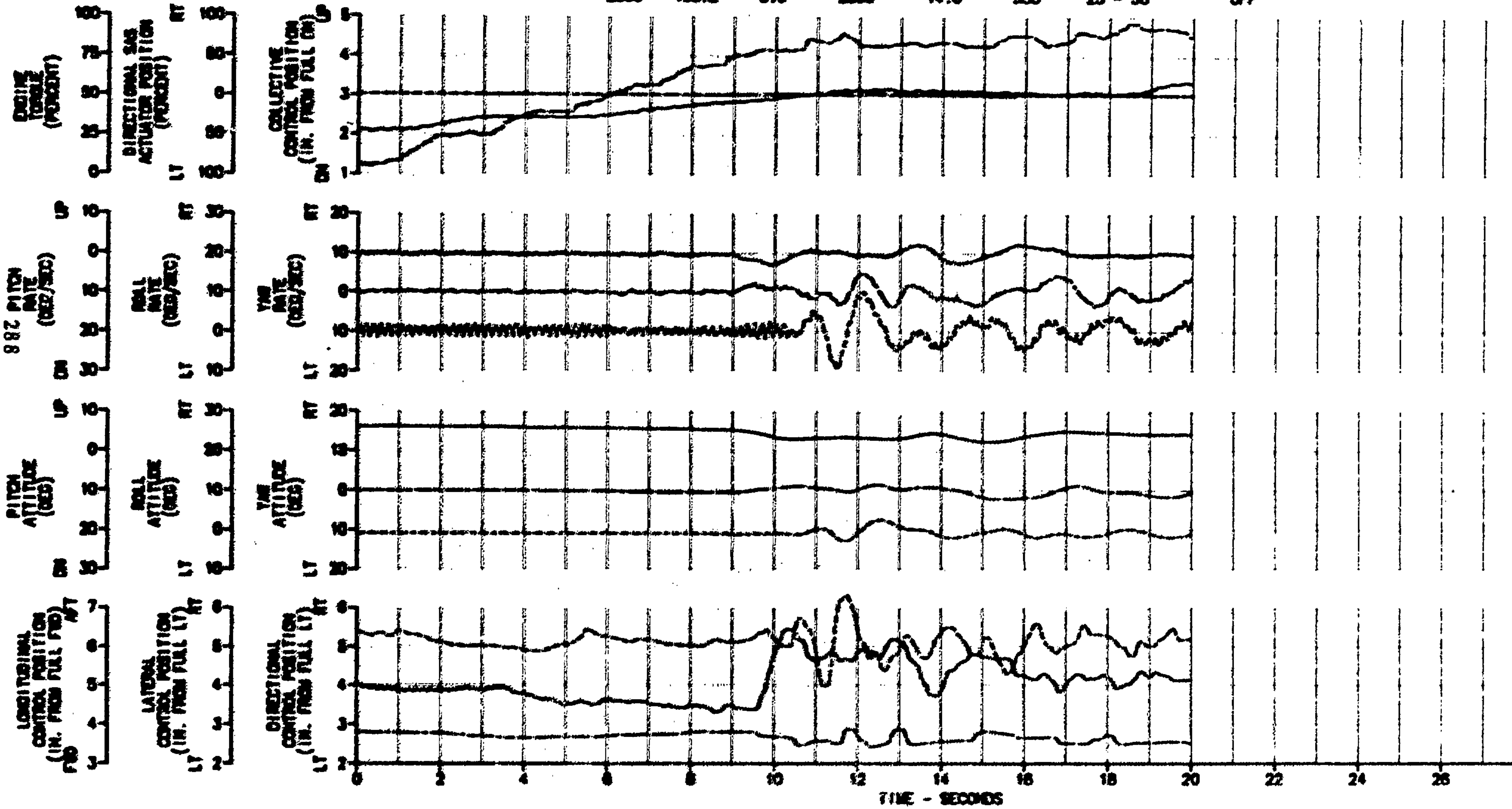


FIGURE E-253
LANDING FROM A HOVER
JOH-58C USA S/N 70-15349

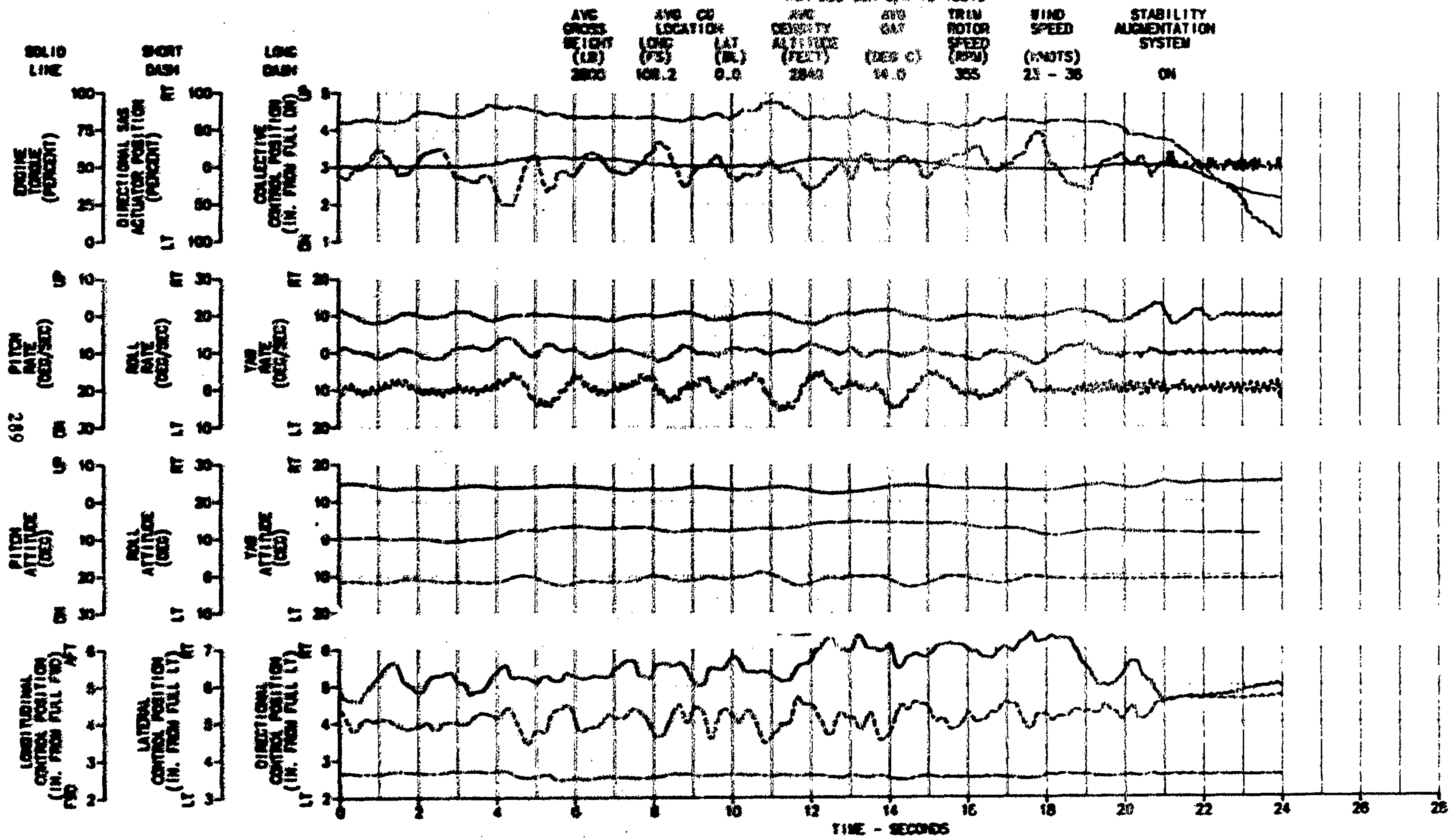


FIGURE E-254
LANDING FROM A HOVER
JOH-58C USA S/N 70-15349

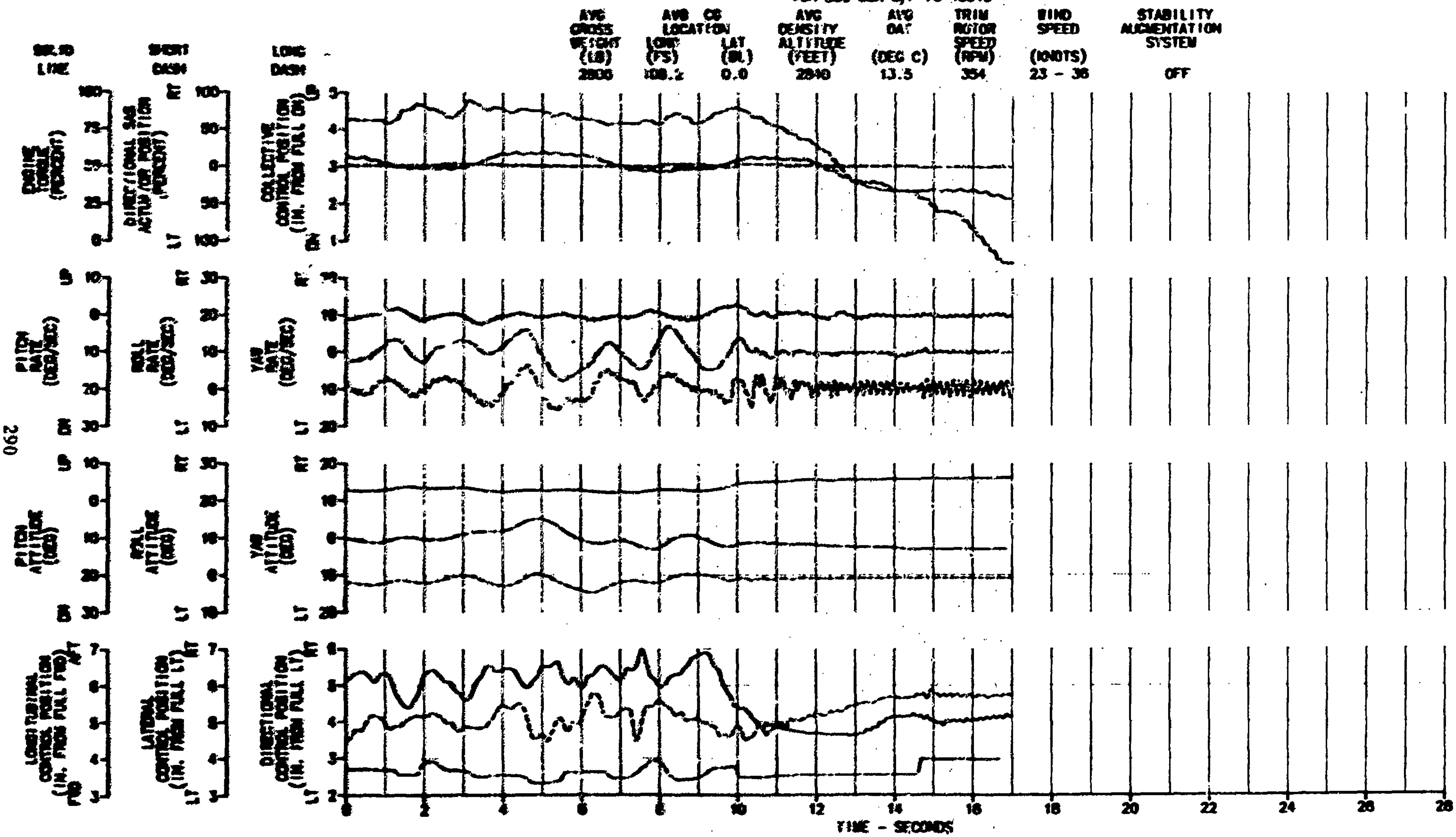
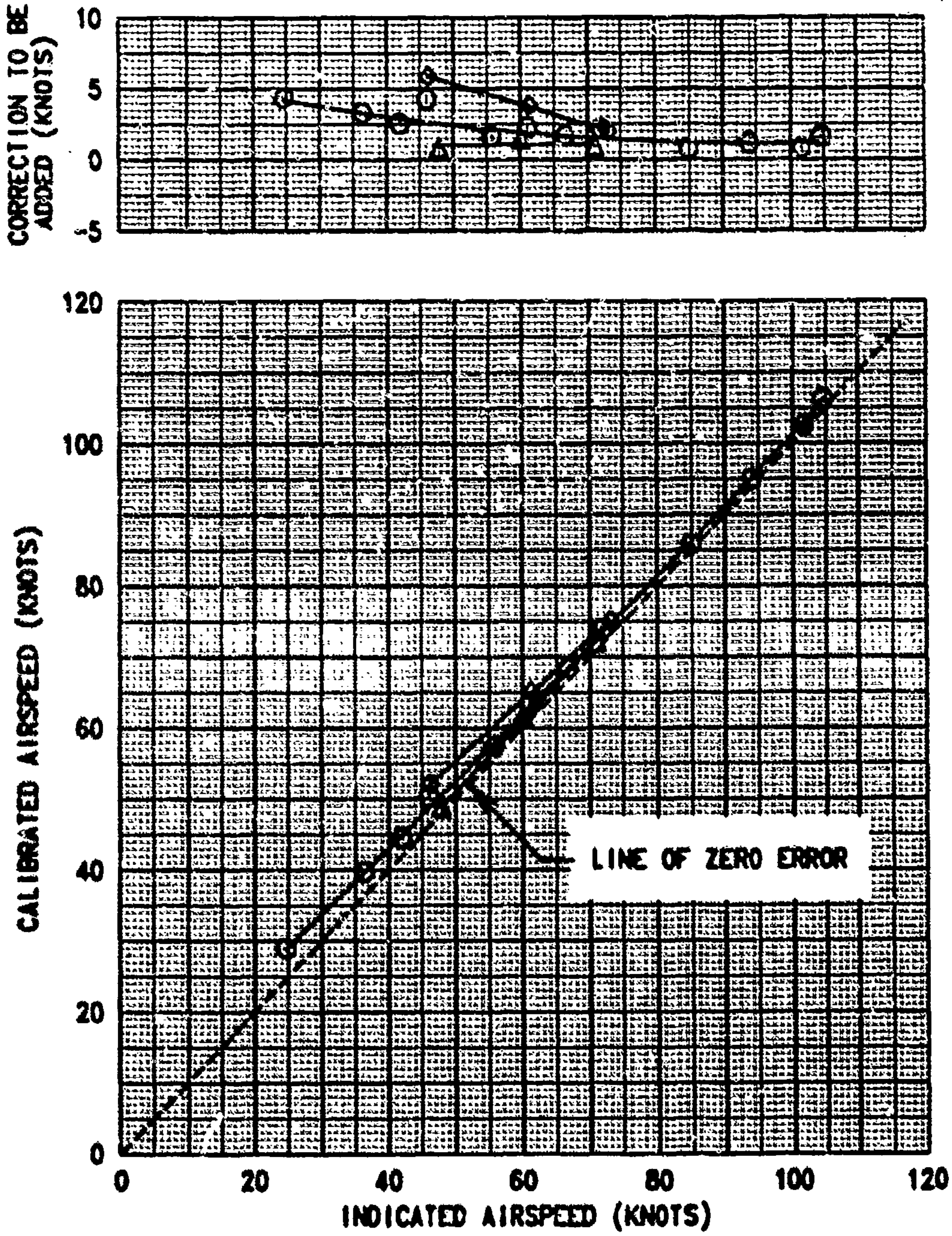


FIGURE E-255
SHIP SYSTEM AIRSPEED CALIBRATION
JOH-58C USA S/N 70-15349

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	FLIGHT CONDITION
○	2940	108.1	0.0	6020	20.5	354	LEVEL
◇	2880	107.8	0.0	5980	20.5	354	CLIMB
△	2900	107.9	0.0	5920	20.5	354	AUTOROTATION

NOTES: 1. CONFIGURATION: CLEAN, DOORS ON
2. TRAILING BOMB METHOD



DISTRIBUTION

HQDA (DALO-AV)	1
HQDA (DALO-FDQ)	1
HQDA (DAMO-HRS)	1
HQDA (SARD-PPM-T)	1
HQDA (SARD-RA)	1
HQDA (SARD-WSA)	1
US Army Material Command (AMCDE-SA, AMCDE-P, AMCQA-SA, AMCQA-ST)	4
US Training and Doctrine Command (ATCD-T, ATCD-B)	2
US Army Aviation Systems Command (AMSAV-8, AMSAV-Q, AMSAV-MC, AMSAV-ME, AMSAV-L, AMSAV-N, AMSAV-GTD)	8
US Army Test and Evaluation Command (AMSTE-TE-V, AMSTE-TE-O)	2
US Army Logistics Evaluation Agency (DALO-LEI)	1
US Army Materiel Systems Analysis Agency (AMXSY-RV, AMXSY-MP)	8
US Army Operational Test and Evaluation Agency (CSTE-AVSD-E)	2
US Army Armor School (ATSB-CD-TE)	1
US Army Aviation Center (ATZQ-D-T, ATZQ-CDC-C, ATZQ-TSM-A, ATZQ-TSM-S, ATZQ-TSM-LH)	5
US Army Combined Arms Center (ATZL-TIE)	1
US Army Safety Center (PESC-SPA, PESC-SE)	2
US Army Cost and Economic Analysis Center (CACC-AM)	1
US Army Aviation Research and Technology Activity (AVSCOM) NASA/Ames Research Center (SAVRT-R, SAVRT-M (Library)	3

US Army Aviation Research and Technology Activity (AVSCOM) Aviation Applied Technology Directorate (SAVRT-TY-DRD, SAVRT-TY-TSC (Tech Library)	2
US Army Aviation Research and Technology Activity (AVSCOM) Aeroflightdynamics Directorate (SAVRT-AF-D)	1
US Army Aviation Research and Technology Activity (AVSCOM Propulsion Directorate (SAVRT-PN-D)	1
Defense Technical Information Center (FDAC)	2
US Military Academy, Department of Mechanics (Aero Group Director)	1
ASD/AFXT, ASD/ENF	2
US Army Aviation Development Test Activity (STEBG-CT)	2
Assistant Technical Director for Projects, Code: CT-24 (Mr. Joseph Dunn)	2
6520 Test Group (ENML)	1
Commander, Naval Air Systems Command (AIR 5115B, AIR 5301)	3
Defense Intelligence Agency (DIA-DT-2D)	1
School of Aerospace Engineering (Dr. Daniel P. Schrage)	1
Headquarters United States Army Aviation Center and Fort Rucker (ATZQ-ESO-L)	1
Commander, US Army Aviation Systems Command (AMSAV-EA)	1
Commander, US Army Aviation Systems Command (AMSAV-EIO)	1
Commander, US Army Aviation Systems Command (AMSAV-LOH)	2